Submittal
APC Silcon 30kW/30kVA
480V Input / 480V Output
UPS SYSTEM

Submitted to: Paul Egger
Company: Microsoft Corporation
DATE: May 1, 2001

CONTENTS

Section I: Bill of Materials……... Proposed System Weights and Dimensions

Section II: UPS Technical Description… Description of UPS and APC Services

Section III: System Installation Data…. System Drawings and Infrastructure Planning Guide

Section IV: Literature…… UPS, Accessories and Battery Solution

SECTION I

Bill of Materials

Includes:

- System Part Numbers
- System Descriptions
- System Dimensions
- System Weights
- Service Offerings

BILL OF MATERIALS

Quantity	Description	Specifications
1	APC Silcon SL30KGB2 [1] (Internal Batteries provide 10 minutes of backup at 24kW Load)	480V, 30kW UPS **39.37”W x 31.50”D x 55.12”H** **1606 lbs**
1	MISC-SBP Service Bypass Panel	480V Input / 480V Output **30”W x 11.75”D x 42”H** **190 lbs**
1	WSSP1-T8 Essential Power Reliability Package [2]	APC Service
1	WUPC 4 Hour Response Upgrade [3]	APC Service
1	On-Site Training (Concurrent with Start-Up)	APC Service
1	Load Bank Testing	APC Service

[1] Battery solution uses 128 Panasonic LC-R127R2P batteries. Each battery contains 0.084 US Gallons of electrolyte.

[2] This service provides 1-year on-site warranty coverage on APC hardware including parts, batteries, labor, and travel expenses.

[3] 4-hour guaranteed response time to most major metropolitan areas.

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SECTION II

UPS Technical Description

Includes:

- ?? System Technical Description as reference only. Not necessary for installation.
- ?? UPS electrical performance data.

SECTION III

System Installation Data

Includes:

?? Complete set of system drawings for evaluation and installation of the UPS system.

?? Planning matrix to provide **minimum** requirements to install the APC UPS system. Consult with certified Professional Engineer(s) for site-specific application requirements.

?? Planning Guide includes notes making specific references. Familiarization with these note is important.

SECTION IV

Quick Reference Guide

Includes:

- General UPS Electrical Data
- Battery Run Time Data
- Efficiency Data

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?? Includes applicable brochures for reference only.

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AMERICAN POWER CONVERSION
DELTA CONVERSION ON-LINE
STATIC UNINTERRUPTIBLE POWER SUPPLY
SECTION 16611

Section 1 - GENERAL

1.01 SUMMARY

This specification describes a three-phase, on-line, continuous operation, solid-state uninterruptible power supply (UPS). The UPS shall operate as an active power control system, working in conjunction with the building electrical system to provide power conditioning and on-line power protection for the critical loads.

1.02 SYSTEM DESCRIPTION

A. **Modes of operation**: The UPS shall operate as an on-line system in the following modes:

1. **Normal**: The main inverter and the delta inverter shall operate in an on-line manner to continuously regulate the power to the critical load. The delta inverter and main inverter also shall derive power from the AC input source and supply DC power to float charge the battery.

2. **Battery**: Upon failure of the AC input source, the critical load shall continue being supplied by the main inverter without any switching. The inverter shall obtain its power from the battery. There shall be no interruption in power to the critical load upon failure or restoration of the AC input source.

3. **Recharge**: Upon restoration of the AC input source, the delta inverter and main inverter shall simultaneously recharge the battery and regulate the power to the critical load.

4. **Bypass**: The static bypass switch shall be used for transferring the critical load to input supply without interruption. Automatic re-transfer to normal operation shall also be accomplished with no interruption in power to the critical load. The static bypass switch shall be capable of manual operation.

5. **External maintenance bypass [optional]:** The external maintenance bypass switch shall be used for supplying the load directly from the mains supply, while the UPS is isolated for maintenance.

B. **Future expansion**: The UPS shall be capable of field-up-grade to allow parallel operation with additional UPS modules for increased capacity or for redundant operation. The parallel systems shall be capable of operation on a common DC bus or with a separate DC bus for each system module and shall provide proportional load sharing between all available modules. To provide a true fault tolerant control system, any individual UPS module shall be capable of automatically assuming control of the entire system.

1.03 STANDARDS

A. **Safety**:

a. USA/Canada:
UL Listed to UL1778 - Standards for Uninterruptible Power Supply Equipment. cUL Listed to CSA

b. Europe: En 50091-1

B. **Emission and Immunity**:

1. USA/CANADA: FCC Class A
2. Europe: EN 50091-2

C. **CE-Mark**. 50 Hertz Models

1.04 SUBMITTALS

A. Proposal submittals:

1. As bid system bill of materials.
2. Product catalog sheets or equipment brochures.
3. Product guide specifications.
4. System single-line operation diagram.
5. Installation information, including weights and dimensions.
6. Information about terminal locations for power and control connections.
7. Drawings for requested optional accessories.

B. Delivery submittals:

Submit 1 of the following:

1. Installation manual which includes instructions for storage, handling, examination, preparation, installation, and start-up of the UPS.
2. User manual which includes UPS operating instructions.

1.05 QUALIFICATIONS

A. **Manufacturer experience**: The manufacturer shall have a minimum 25 years of experience in the design, manufacture, and testing of UPS systems.

B. **ISO 9001 Certification**: The manufacturer shall be ISO 9001 certified.

1.06 Environmental requirements:

A. **Storage ambient temperature**: -58°F to 131°F (-50°C to 55°C).

B. **Operating ambient temperature**: 32°F to 104°F (0°C to 40°C).
(68°F to 77°F (15°C to 25°C), is ideal for batteries).

C. **Relative humidity**: 0 to 95%, non-condensing.

1.07 WARRRANTY

A. **UPS Module**: The UPS manufacturer shall warrant the UPS module against defects in workmanship and materials for 1 year from the date of retail sale or the date of delivery to the initial user, whichever occurs first, however not exceeding 18 months from date of delivery. The warranty shall include coverage of all internal parts, including internal batteries.

B. **External Batteries**: For batteries connected to the UPS, the battery manufacturer's standard warranty will apply.

Section 2 - PRODUCT

2.01 MANUFACTURER

A. Provide American Power Conversion: APC Silcon series system. No substitutes will be considered.

2.02 SYSTEM CONFIGURATION

Initially provided as a single module, non-redundant system. The UPS shall be field-upgradeable for additional capacity or for redundant operation.

2.03 SYSTEM RATINGS AND OPERATING CHARACTERISTICS

A. **System continuous rating**: 30 kVA and 30 kW at unity power factor.

B. **Battery capacity**: The system must be capable of providing 16 minutes of battery back-up time at a 16 kW load, 10 minutes of battery back-up at 24 kW load, and 8 minutes of battery back-up a 30 kW load.

C. **Input voltage rating**: 480 volts, three-phase, three or four-wire grounded wye.

D. **Input voltage range**: +15%, -15%.

E. **Input frequency**: 60 Hz +/- 6% (other levels programmable).

F. **Magnetizing inrush current**: NONE, if optional input isolating transformer is installed then 500% of nominal input current for less than one cycle.

G. **Power walk-in**: 0 to 100% over a 10-second period (longer duration programmable).

H. **Input power factor**:

Min. 0.93 lagging at 25% load.
Min. 0.99 lagging at 100% load.

I. **Input current distortion**: 5% THD maximum at full rated load and nominal input voltage without additional harmonic filters.

J. **Output voltage rating**: 480 volts, three-phase, four-wire plus ground.

K. **Output voltage regulation (at default parameter settings):**

1. +/- 1% steady state for a static 100% balanced load.
2. +/- 3% steady state for a static 100% unbalanced load.
3. +/- 5% for a 0 to 100% load step.

L. **Output frequency regulation**: 60 Hz +/- 0.1 Hz free running (battery operation). Input synchronized in normal operation.

M. **Output power factor range**: 0.9 leading to 0.8 lagging at rated kVA. The unit's kVA capacity shall not require derating for a 1.0 load power factor.

N. **Output harmonic distortion**:

1. 3% THD maximum and 1% any single harmonic for a 100% linear load.
2. 5% THD maximum for a 100% non-linear load (no crest factor limit), UPS 10-60kVA and 120-500kVA.
3. 6% THD maximum for a 100% non-linear load, (no crest factor limit), UPS 80kVA.

O. **Voltage transient response**:

1. +/- 3% for a 50% load step.
2. +/- 5% for a 100% load step.

P. **Voltage transient recovery time**: 50 milliseconds to nominal.

Q. **Phase displacement**:

1. 120 degrees +/- 1 degree for balanced load.
2. 120 degrees +/- 1 degree for 50% unbalanced load.
3. 120 degrees +/- 3 degrees for 100% unbalanced load.

R. **Overload capability**:

1. 200% for 60 seconds in normal operation.
2. 125% for 10 minutes in normal operation.
3. 150% for 30 seconds in battery operation.
4. 125% continuously in bypass operation.
5. 1000% for 500 milliseconds in bypass operation.

S. **Short circuit withstand**: The UPS must withstand a bolted-fault short circuit on the output without damage to the UPS module.

T. **System AC to AC efficiency**: 94.7% at 100% linear load, nominal input voltage, with batteries fully charged.

U. **Acoustical noise**: dB(A) of noise, typical, measured at 1 meter from the operator surface:

70% load:	100% load:
30kVA: 55	30kVA: 65

2.04 UPS DESIGN AND FABRICATION

A. **Modular sub-assemblies**: For ease of maintenance and service, the UPS must have field-replaceable modular sub-assemblies.

B. **Materials**: All materials comprising the UPS module shall be new, of current manufacture, and shall not have been in prior service except as required during factory testing. The UPS module shall contain no PCBs.

C. **Inverter/Battery charger**:

1. The delta inverter and main inverter shall be a high-speed insulated-gate bi-polar transistor switch module type (IGBT) and shall be controlled by a pulse-width modulation technique to precisely regulate system output voltage and battery charge current.

2. **Output current limit**: The main inverter shall be capable of supplying overload current of 150% of the system rating for 30 seconds.

3. **Temperature protection**: The inverters shall be temperature protected. In case of inverter over temperature, the unit shall activate an alarm and automatically transfer to static bypass operation.

4. **Charging operation modes**:

   a. **Float charge**: Under nominal operating conditions, the delta inverter and main inverter shall provide a precisely regulated nominal DC bus voltage (programmable).

   b. **Boost charge**: The delta inverter and main inverter shall provide a boost charge of 2.27 to 2.40 volts per cell (programmable) for a period of 1 to 24 hours (programmable).

5. **Battery charging temperature compensation**: For protection of the batteries, the unit shall monitor the temperature of the batteries. To extend battery life, charge voltage must be compensated for changes in battery temperature.

6. Battery charge current limit: The battery charging current limit must be limited to 10% of nominal DC discharge current (programmable to lower level).

D. **Static switch**:

1. The static switch shall be solid state, rated for continuous duty and be provided with it's own dedicated, redundant power supply.

2. The static bypass switch shall automatically transfer the critical load to mains supply without interruption after the logic senses one of the following conditions:

    a. Inverter overload beyond rating.
    b. Battery runtime expired and bypass available.
    c. Inverter failure.
    d. Battery circuit breaker open.
    e. Fatal error in control system.

3. The static bypass switch shall automatically retransfer from bypass to the delta inverter and main inverter, when one of the following conditions occurs:

    a. After an instantaneous overload-induced transfer has occurred and the load current has returned to less than 100% of the system rating.

    b. The UPS delta inverter and main inverter are active (on).

2.05 BATTERY PLANT

A. **Battery type**: Valve-regulated lead acid battery cells designed for UPS high rate discharge.

B. **Design Lifetime**: 10 years

C. **DC ripple**: Max. 0.2C.

D. **Low battery voltage protection**: To prevent total discharge or damage to the battery, the UPS shall transfer to standby operation when the battery voltage reaches a set minimum voltage level (programmable). If the AC input source has not returned within 10 minutes after low battery shutdown, the UPS shall electronically disconnect DC power from the battery to avoid deep discharge.

E. **Battery monitor**: A battery monitor function shall be capable of monitoring and defining battery capacity. It shall be possible to program the unit to perform an automatic battery test every 90 days to test the condition of the battery.

G. **Battery manufacturing controls**: Each battery cell shall be clearly identified as to cell type, voltage, and capacity. All cells in the battery have to be factory tested to verify 100% system capacity. The equipment shall be designed and manufactured under a quality assurance program which is controlled and documented by written policies, procedures, or instruction.

H. **Battery cabinet assembly**: A free-standing, cabinet that complements the appearance of the UPS and is designed to allow for ease of maintenance. The battery cabinet assembly shall include battery disconnects to provide a positive means of isolating the battery from the rest of the system. The disconnects shall be capable of EPO operation

I. **Battery disconnect**: For units with external batteries in racks, provide a positive means of isolating both the battery strings from the rest of the system.

2.06 DISPLAY AND CONTROLS

A. **Display unit**: A microprocessor-controlled display unit shall be located at the front of the UPS cabinet. The display unit shall consist of an alphanumeric display with backlight, an alarm LED, and a touch keypad.

B. **UPS status messages**: The display unit shall display the following UPS status messages:

1. **Normal operation**: load power [X]%
2. **Battery operation**: time [X] minutes.
3. **Bypass operation**
4. **Standby**
5. **System off**

B. **Metered parameters**: The display unit shall allow the user to display the following metered parameters:

1. Year, Month, Day, Hour, Minute, Second
2. Source Input AC voltage (line-to-line, three-phase simultaneous)
3. Source Input AC current (line-to-neutral, three-phase simultaneous)
4. Output AC voltage (line-to-line, three-phase simultaneous)
5. Output AC current (line-to-neutral, three-phase simultaneous)
6. Output frequency
7. Battery voltage
8. Battery current (charge/discharge)
9. Battery temperature
10. Output peak current

D. **Alarms**: The display unit shall allow the user to display a log of all active alarms. A minimum of 50 alarm conditions shall be monitored.

E. **Events log**: The display unit shall allow the user to display a time- and date-stamped log of the 250 most recent UPS status and alarm events.

F. **Controls**: The following control or programming functions shall be accomplished with the display unit:

1. Silence an audible alarm.
2. Set the alphanumeric display language to English or the alternate language.
3. Display or program the time and date.
4. Enable or disable the automatic restart feature.
5. Transfer to or from static bypass operation.
6. Program the unit for economy operation.
7. Program the battery charger.
8. Calculate battery back-up time.
9. Test battery condition on demand.

10. Program the unit to periodically test battery condition.
11. Program voltage and frequency windows.
12. Calibrate metered parameters.
13. Enable or disable adaptive slew rate. Set maximum slew rate.
14. Adjust set points for different alarms.
15. Program the remote shutdown contact (enable/disable remote shutdown, polarity, delay).
16. Set the delay for the common fault contact.
17. Program the unit for soft start for use with a generator.

G. **UPS On and Off push buttons**: Momentary UPS on and off push buttons shall be provided in a user-accessible compartment. Upon activation of the on push button, the UPS shall automatically connect the UPS output to the critical load. Upon activation of the off push button, the UPS shall remove power from the critical load.

H. **Potential free contacts**:
The UPS shall be equipped with two potential free (dry) contacts:
1. Common fault alarm.
2. Battery operation.

Other potential free (dry) contacts shall be available as option.

I. **Communication interface board**: A communication interface board shall provide the following communication ports, and it shall be possible to use two or more ports simultaneously.

1. RS232 serial port #1.
2. RS232 serial port #2.
3. COM-PORT with the following normally open or normally closed potential free (dry) contacts:

    a. UPS on.
    b. Static bypass operation.
    C. Battery operation.
    d. Battery low.

J. **External maintenance bypass**: The external maintenance bypass shall supply the load from the bypass source while the UPS is isolated for maintenance. A UPS input, output, and bypass switch shall be housed in the same cabinet. Each switch must be monitored by the UPS via auxiliary contacts. The maintenance bypass must be housed in a wall mounted or freestanding enclosure that complements the appearance of the UPS.

K. **Battery charger temperature compensation**: For units with external batteries, the battery charging temperature compensator shall monitor the temperature in one battery cabinet.

L. **Network Adapter**:

The Ethernet/Token Ring SNMP adapter shall allow one or more network management systems (NMS) to monitor and manage the UPS in TCP/IP network environments. The management information base (MIB) shall be provided in DOS and UNIX tar formats. The SNMP interface adapter shall be connected to the UPS via the RS232 serial port on the standard communication interface board.

M. **Unattended Graceful Operating system, Shutdown and Remote monitoring**:

- **Server Shutdown**:

1. The UPS, in conjunction with a network interface card, shall be able to gracefully shutdown one or more operating systems during an on battery situation (Ethernet TCP/IP networks).

2. The UPS shall also be able to use an RS232 port to communicate over a DB9 serial cable and gracefully shutdown one or more operating systems during an on battery situation.

- **Remote UPS monitoring**

Remote UPS monitoring shall be possible in three ways:

1. **Web monitoring**: Remote UPS monitoring shall be possible via a web browser such as Internet explorer or Netscape Navigator.

2. **RS232 monitoring**: Remote UPS monitoring shall be possible via either RS-232 or contact closure of the UPS.

3. **Out of Band Management**: Out of Band remote UPS monitoring shall be possible via either RS-232 in conjunction with a Hayes compatible modem.

The UPS manufacturer shall have available software to support graceful shutdown and remote monitoring for the following systems:

a. Microsoft Windows 3.1, 3.11
b. Microsoft Windows 95
c. Microsoft Windows NT
d. OS/2
e. Netware 3.12, 4.1, 4.11
f. Apple
d. DEC VMS
g. DG-UX
h. Silicon Graphics
i. DEC OSF/1
j. SCO UNIX
k. SCO XENIX
l. SVR4
m. Interactive
n. Unix Ware
o. SUN Solaris
p. SUN OS
q. IBM AIX
r. HP-UX

M. **Parallel operation**: UPS modules shall be capable of running in parallel operation for increased capacity or for redundant operation. The parallel board shall ensure proper

control of parallel units and proper load sharing. One parallel board shall be provided for each unit connected in parallel.

2.07 MECHANICAL DESIGN

A. **Enclosure**: The UPS shall be housed in a freestanding enclosure. The enclosure shall be designed to blend into a computer room environment. The cabinet shall be equipped for fork truck lifting. The UPS cabinet shall be painted with the manufacturers standard color. All service access shall be from the front and top for 10-40kVA. 60kVA – 500kVA models require front access for field wiring terminations.

B. **UPS module dimensions**: Height x Width x Depth.

30kVA/kW 208V/480V = 55.12 x 39.37 x 31.50 in. (1400 x 1000 x 800 mm);

C. **Ventilation**: The UPS shall be cooled by forced air and shall be equipped with fan monitoring circuits. External battery systems shall be cooled by free-air ventilation and convection.

Section 3 – EXECUTION

3.01 FACTORY ASSISTED START-UP [Optional]

If a factory assisted UPS start-up is requested, factory trained service personnel shall perform the following inspections, test procedures, and on-site training:

A. **Visual Inspection**:

1. Inspect equipment for signs of damage.
2. Verify installation per manufacturer s instructions.
3. Inspect cabinets for foreign objects.
4. Verify correct electrolyte level of flooded cells (if applicable).
5. Inspect battery cases.
6. Inspect batteries for proper polarity.
7. Verify all printed circuit boards are properly configured.

B. **Mechanical Inspection**:

1. Check all UPS, external maintenance bypass cabinet, and DC disconnect switch internal control wiring connections.
2. Check all UPS, external maintenance bypass cabinet, and DC disconnect switch internal power wiring connections.
3. Check all UPS, external maintenance bypass cabinet, and DC disconnect switch terminal screws, nuts, and/or spade lugs for tightness.

C. **Electrical Inspection**:

1. Check all UPS fuses for continuity.
2. Verify correct input and bypass voltage.
3. Verify correct phase rotation.

4. Verify correct UPS control wiring and terminations.
5. Verify correct termination and voltage of battery strings.
6. Verify neutral and ground conductors are properly configured.
7. Inspect external maintenance bypass switch for proper terminations and phasing.

C. **Site Testing**:

1. Ensure proper system start-up.
2. Verify proper firmware control functions.
3. Verify proper firmware bypass operation.
4. Verify proper maintenance bypass switch operation.
5. Verify system set points.
6. Verify proper inverter operation and regulation circuits.
7. Simulate utility power failure.
8. Verify proper charger operation.
9. Document, sign, and date all test results.

D. **On-Site Operational Training**: During the factory assisted start-up, operational training for site personnel shall include key pad operation, LED indicators, start-up and shutdown procedures, maintenance bypass and AC disconnect operation, and alarm information.

3.02 MANUFACTURER FIELD SERVICE

A. **Worldwide service**: The UPS manufacturer shall have a worldwide service organization available consisting of factory trained field service personnel to perform start-up, preventative maintenance, and service of the UPS system and power equipment. The service organization shall offer a 24 hours a day, 7 days a week, 365 days a year service support.

B. **Replacement parts**: Parts shall be available through the worldwide service organization 24 hours a day, 7 days a week, 365 days a year. The worldwide service organization shall be capable of shipping parts within 4 working hours or on the next available flight, so that the parts may be delivered to the customer site within 24 hours.

3.03 MAINTENANCE CONTRACTS

A complete offering of preventative and full service maintenance contracts for the UPS system and the battery system shall be available. Contract work shall be performed by factory trained service personnel.

3.04 TRAINING

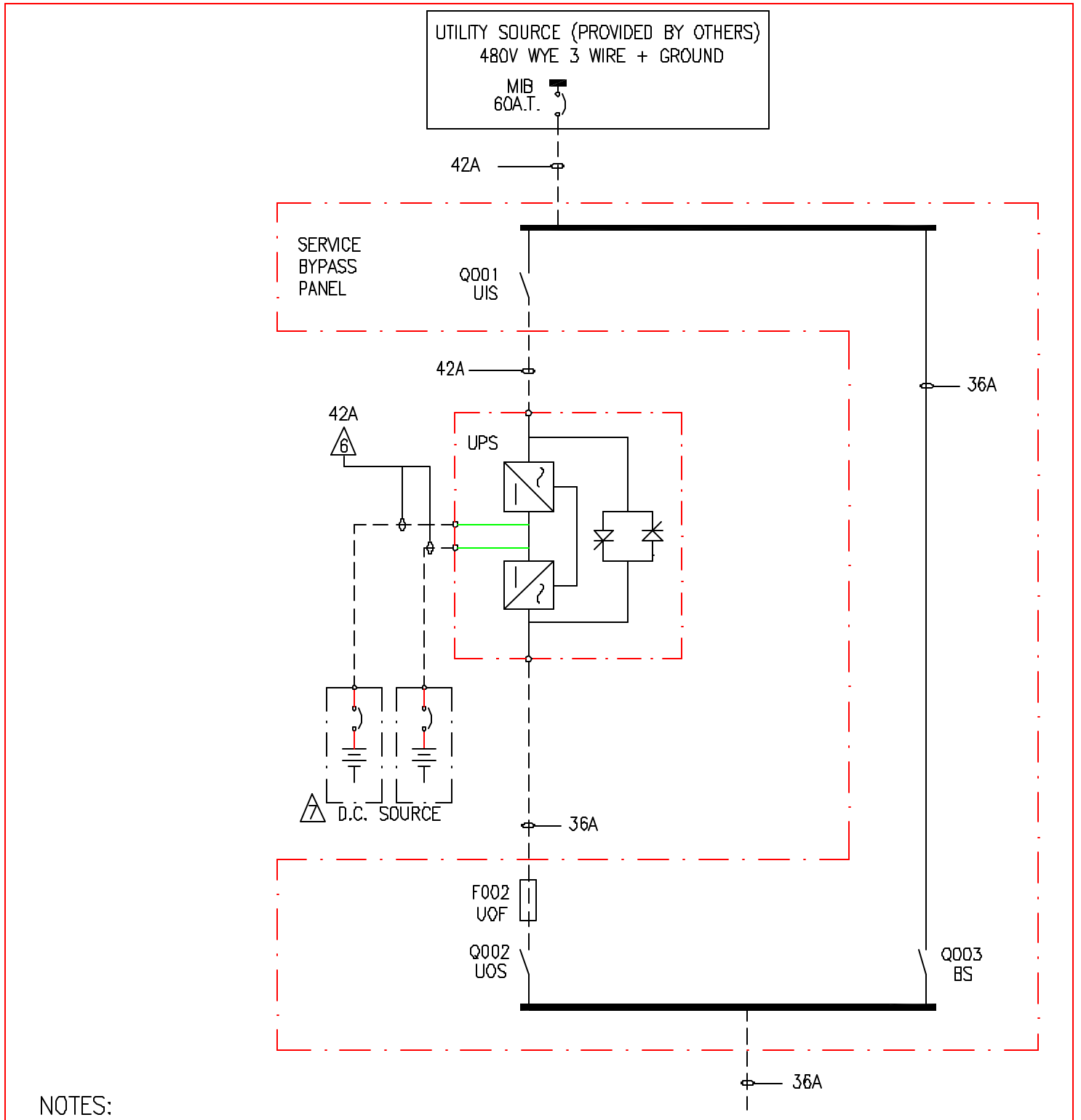
UPS service training workshop: A UPS service training workshop shall be available from the UPS manufacturer. The service training workshop shall include a combination of lecture and practical instruction with hands-on laboratory sessions. The service training workshop shall include instruction about safety procedures, UPS operational theory, sub-assembly identification and operation, system controls and adjustment, preventative maintenance, and troubleshooting.

SECTION III

System Installation Data

Includes:

- Complete set of system drawings for evaluation and installation of the UPS system.
- Planning matrix to provide **minimum** requirements to install the APC UPS system. Consult with certified Professional Engineer(s) for site-specific application requirements.
- Planning Guide includes notes making specific references. Familiarization with these note is important.



NOTES:

1. MUST BE 3 WIRE + GROUND PROVIDED WYE-SOURCE.
2. - - - - - - = CABLING PROVIDED BY OTHERS.
3. F002 (INTERNAL OUTPUT FUSE) = 40A
4. INPUT OVERCURRENT PROTECTION IS BASED ON 80% RATING ANY DEVIATION PLEASE CONTACT APC.
5. ALL AC POWER CABLING IS 3 WIRE + GROUND AT 480VAC 3-PHASE.
6. △ SEPARATE CONDUITS. TWO WIRE PLUS GROUND.
7. △ SEE BATTERY INSTALLATION INFORMATION.
8. UPS OUTPUT CABLES AND INPUT CABLES MUST BE IN SEPARATE CONDUITS.
9. POWER WIRING AND CONTROL WIRING MUST BE IN SEPARATE CONDUITS.
10. INSTALLATION MUST COMPLY WITH NATIONAL AND LOCAL CODES.

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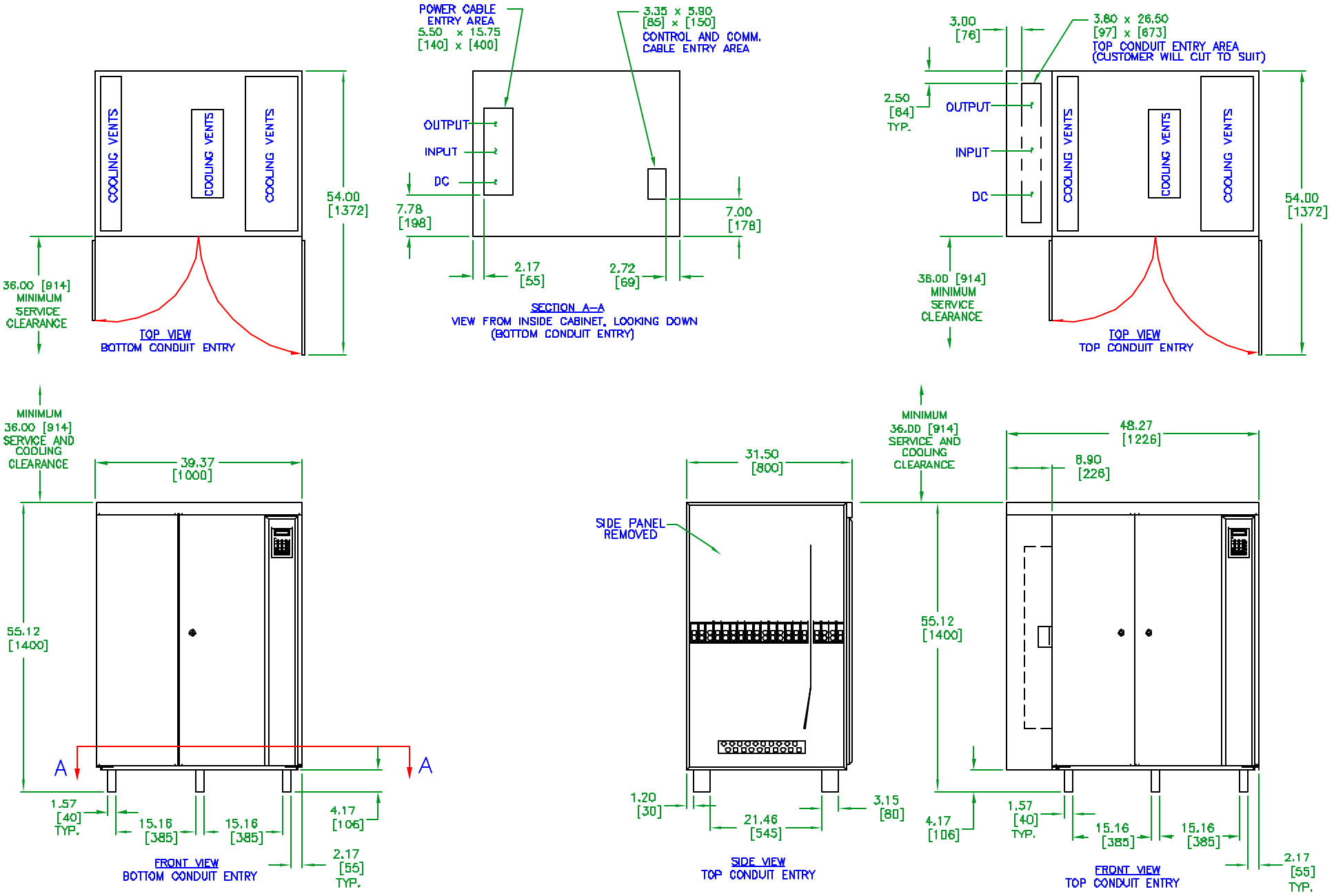
TITLE:	SILCON 30kW UPS ONE LINE DIAGRAM 30kW, 480V 1MOD, SINGLE MAINS
PROJECT:	SUBMITTAL DRAWING
SHEET	X OF X
DWG NO:	APCQ30DC1G1D-SD
REV:	–
DRAWN BY:	K.PATEL 01/12/01
CHECKED BY:	A.SMITH 01/25/01
ENGINEER:	R.HANSEN 01/26/01

AMERICAN POWER CONVERSION
132 FAIRGROUNDS RD
WEST KINGSTON, RI 02892



NOTES:

1. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]
2. MINIMUM COOLING AND SERVICE CLEARANCE 36.00 [914] (FRONT AND TOP)
3. CONDUIT ENTRY IS TOP OR BOTTOM.
4. UNIT WEIGHT: BOTTOM CONDUIT ENTRY = 1606 LBS
   TOP CONDUIT ENTRY = 1917 LBS
5. INSTALLATION MUST COMPLY WITH NATIONAL AND LOCAL CODES.

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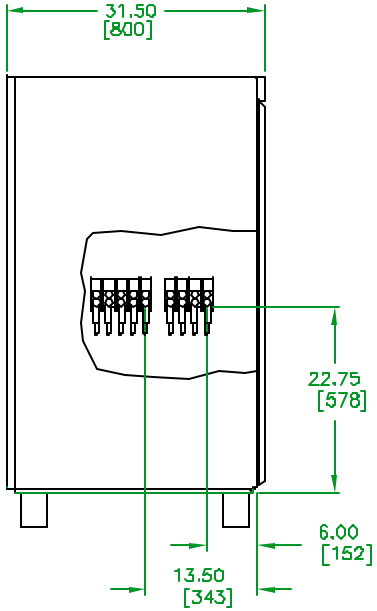
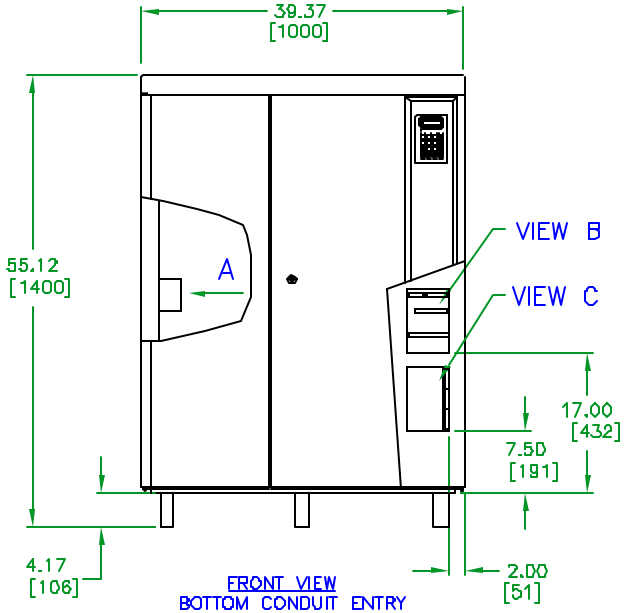
TITLE:	SILCON 30kW UPS W/28PI UPS CABINET MECHANICAL 30kW, 480V
PROJECT:	SUBMITTAL DRAWING
SHEET	1 OF 1
DWG NO:	SL030KGB2-MM
REV.	–
DRAWN BY:	B. ZAHN 07/26/00
CHECKED BY:	R.HANSEN 11/30/00
ENGINEER:	B.HUNT 12/01/00

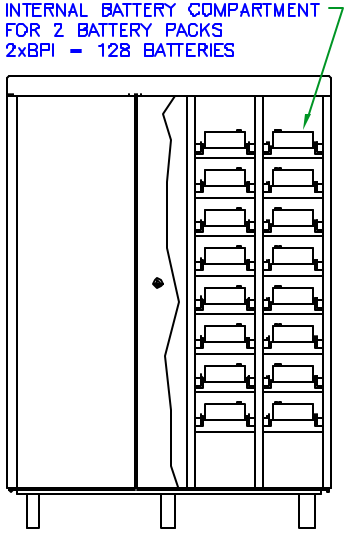
APC
AMERICAN POWER CONVERSION
132 FAIRGROUNDS RD.
WEST KINGSTON, RI 02892

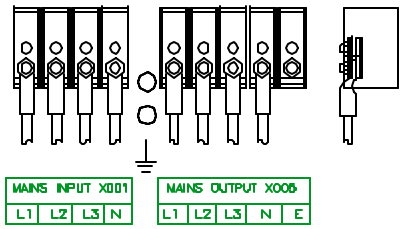


SIDE VIEW
BOTTOM CONDUIT ENTRY

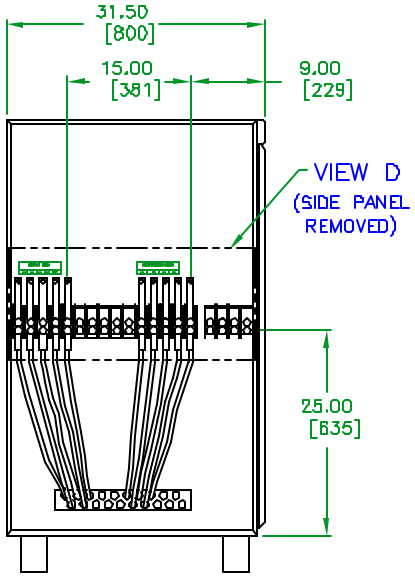


FRONT VIEW
BOTTOM CONDUIT ENTRY

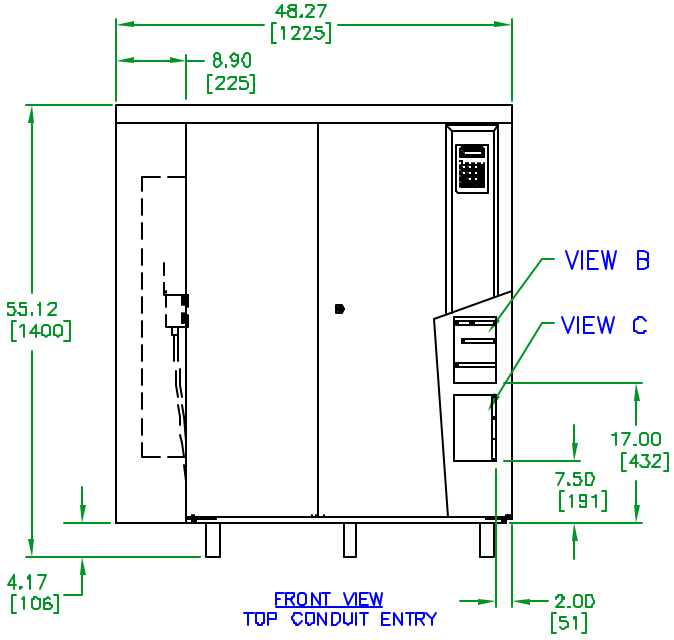




VIEW A
(BOTTOM CONDUIT ENTRY)

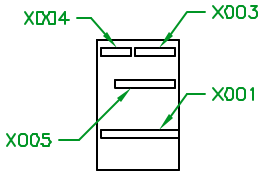


SIDE VIEW
TOP CONDUIT ENTRY



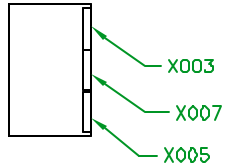
FRONT VIEW
TOP CONDUIT ENTRY

SYSTEM INTEGRATION INTERFACE

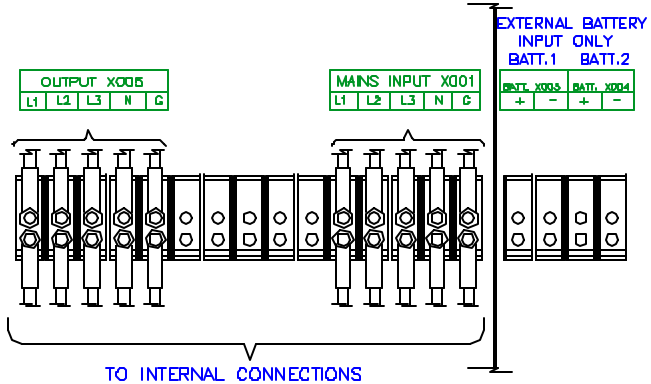


VIEW B

COMMUNICATION INTERFACE



VIEW C



VIEW D

NOTES:
1. ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]
2. CONDUIT ENTRY IS TOP OR BOTTOM.
3. INSTALLATION MUST COMPLY WITH NATIONAL AND LOCAL CODES.

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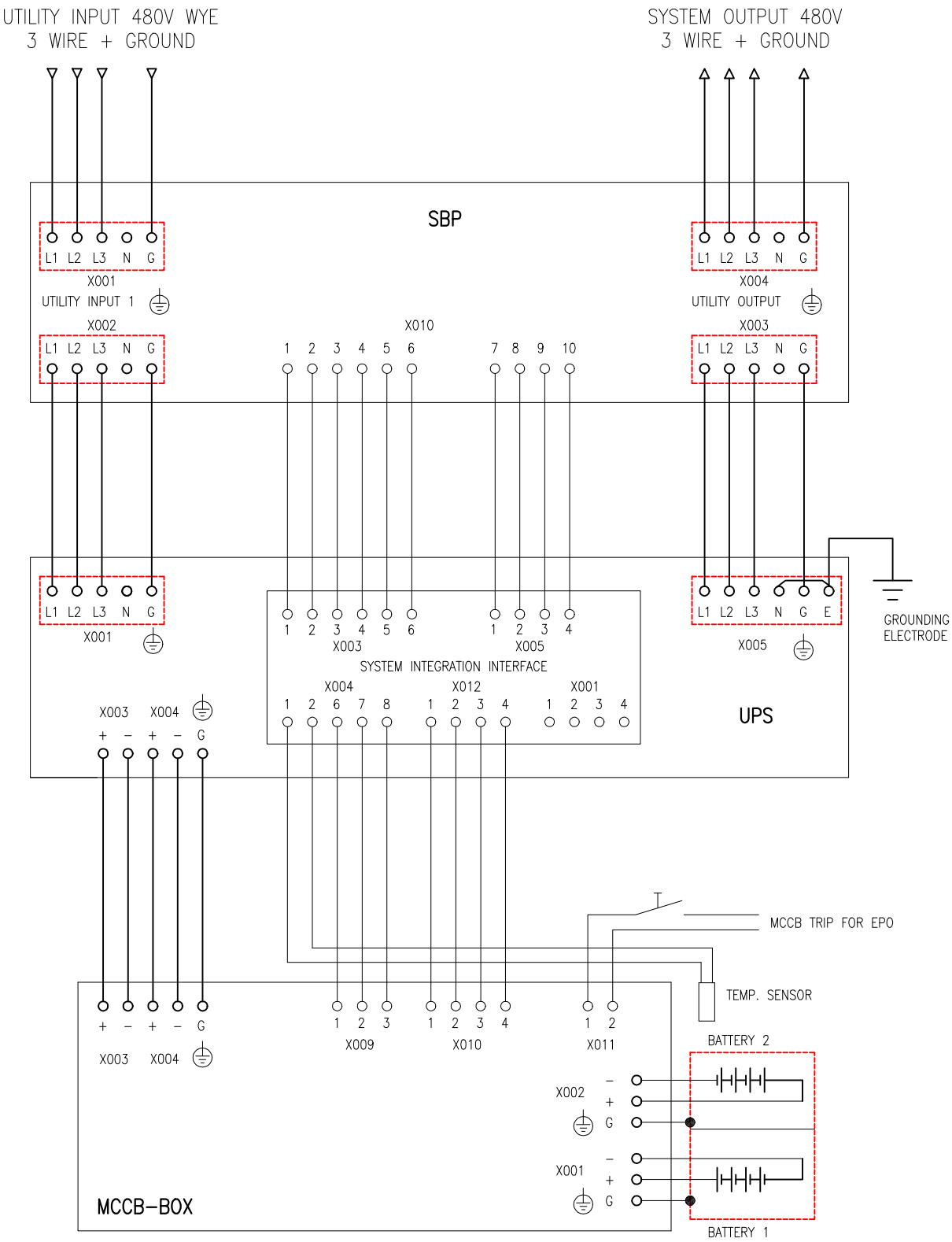
TITLE:	SILCON 30kW UPS W/2BPI UPS CABINET MECHANICAL 30kW, 480V	DWG NO:	SL030KGB2-ME
		REV.	-
		DRAWN BY:	B. ZAHN 07/26/00
		CHECKED BY:	R.HANSEN 11/30/00
PROJECT:	SUBMITTAL DRAWING	ENGINEER:	B.HUNT 12/01/00
SHEET	1 OF 1		

AMERICAN POWER CONVERSION
132 FAIRGROUNDS RD
WEST KINGSTON, RI 02892



NOTES:

1. MUST BE 3 WIRE + GROUND PROVIDED WYE-SOURCE.
2. CABLING PROVIDED BY OTHERS.
3. ALL AC POWER CABLING IS 3 WIRE + GROUND AT 480VAC 3-PHASE.
4. POWER WIRING AND CONTROL WIRING MUST BE IN SEPARATE CONDUITS.
5. INSTALLATION MUST COMPLY WITH ALL APPLICABLE NATIONAL AND LOCAL CODES.

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TITLE:
SILCON 30kW UPS
SYSTEM WIRING DIAGRAM
30kW 480V 1MOD. SINGLE MAINS

PROJECT: SUBMITTAL DRAWINGS | SHEET 1 OF 1

DWG NO: APC030C1G10-WD | REV. –

DRAWN BY:	E.DICHENKO	10/10/00
CHECKED BY:	J.RUNK	02/09/01
ENGINEER:	R HANSEN	02/14/01

APC®
AMERICAN POWER CONVERSION
132 FAIRGROUNDS RD
WEST KINGSTON, RI 02892

Power Rating			AC Input (480V)								Battery System de			AC Output (480V)					
			Source		P (kW)		I (A)		Minimum Input Cable (per phase)	Service Overcurrent Protection[1]	Vn (V)	Full Load P (kW)	Imax Disch (A)	In (A)	Load Side Overcurrent Protection[1]	Dimensions HxWxD (in)	Weight (lbs)	Floor Loading (lbs/in²)[#]	Heat Rejection kBTU/hr
kW	kVA	Pf	V	Hz	Nom.	Max.	Nom.	Max.											
10	10	1	480	60	10.6	11.5	12.8	14.0	1 x 12 AWG	20AT	2x384Vdc	10.8	17	12	15AT	55.12x23.62x31.5	485*	24.45	2.047
15	15	1	480	60	15.9	17.3	19.1	21.0	1 x 10 AWG	30AT	2x384Vdc	16.1	25	18	25AT	55.12x23.62x31.5	605*[t]	30.49	3.071
20	20	1	480	60	21.1	23.0	25.4	28.0	1 x 8 AWG	35AT	2x384Vdc	21.4	33	24	30AT	55.12x23.62x31.5	605*[t]	30.49	3.753
30	30	1	480	60	31.8	34.6	38.2	42.0	1 x 6 AWG	60AT	2x384Vdc	32.4	50	36	50AT	55.12x39.37x31.5	840*[t]	28.23	6.142
40	40	1	480	60	42.1	46.1	50.6	56.0	1 x 4 AWG	70AT	2x384Vdc	43.0	66	48	60AT	55.12x39.37x31.5	840*[t]	28.23	7.165
60	60	1	480	60	63.8	69.2	76.7	84.0	1 x 2 AWG	110AT	2x384Vdc	64.9	99	72	90AT	59.06x39.37x31.5	1125	37.80	12.966
80	80	1	480	60	84.2	92.2	101.3	112.0	1 x 1/0	150AT	2x384Vdc	86.2	132	96	125AT	59.06x39.37x31.5	1170	39.31	14.330
Note							1	2	3,6,8,13,A,B,C,E	4,7,9,E	5,13		6	1	4,6,8,11,13,E	10,11		D	12

[1] Provided by others

[t] Add 385 lbs for dual string internal batteries
[#] Does not include internal batteries. See Note D

Notes:

1. Nominal (Nom) Input current based on rated load.
2. Maximum (Max.) Input current based on full battery recharge + nominal load.
3. Recommendation: Input and Output cables run in separate conduits.
4. Suggested Input overcurrent protection based on continuous full load Maximum Input current. Suggested Load Side Overcurrent Protection based on Nominal current. Breakers sized per NEC 220-3 and NEC 240-3(b). 80% rated breakers assumed. Trip rating based on NEC 240-6(a) standard breaker sizes.
5. Nominal battery voltage assumed to be 2.0 volts/cell (lead technology).
6. Recommendation: All cable should be sized in accordance with NEC 210-19 FPN No. 4 branch feeder voltage drop of 3%. Voltage drop not considered in above chart. Application specific Inpust Cable ampacities may vary from above chart. DC Cable Voltage drop not to exceed 1Vdc in discharge mode.
7. Breaker selection based on Nom input current is acceptable provided battery recharge time is short. Consult factory for application specific assistance.
8. Grounding conductor ampacities: Refer to NEC Article 250-122 and NEC Table 250-122. Neutral conductors ampacities: Refer to NEC Article 310-15.
9. All wiring to be in accordance with all applicable national and/or local electrical codes.
10. Minimum access clearance per UPS drawings.
11. Cable entry per installation guide..
12. Heat rejection calculated at nominal full load capacity.
13. All lugs provided by others.

A. Not more than 3 current carrying conductors in raceway assumed; ambient temperature of 30 ∞C (86 ∞F) assumed. Cable ampacity next size above Overcurrent Protection provided by others.

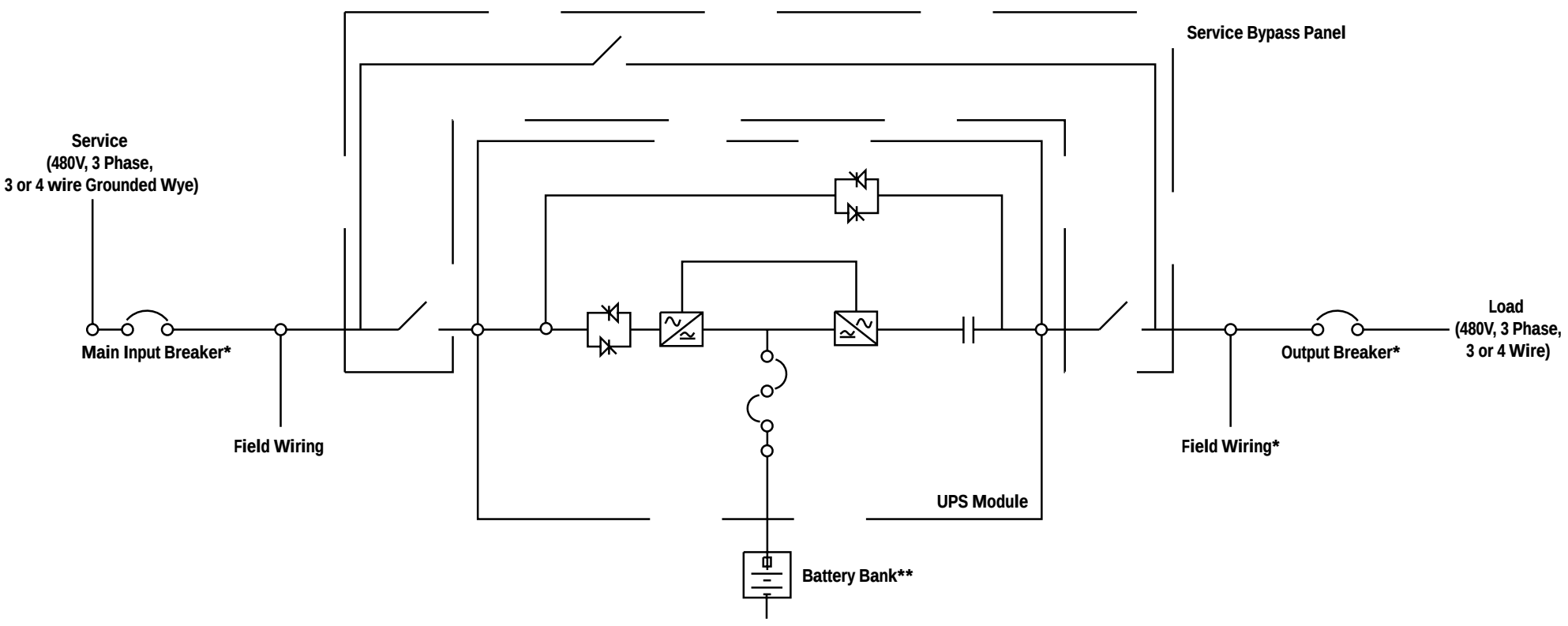
B. Temperature rating of conductors: 90 ∞C (194 ∞F). Reference Table 310-16 of NEC, 75 ∞C column, using copper conductors. 75 ∞C (167 ∞F) cable terminal connectors assumed.

C. Reference: NEC handbook 1999. Consult local codes for possible variations.

D.

Power Rating (kW)	Internal Battery Strings	Floor Loading (lbs/in2)
10	1	43.85
15	1	49.90
20	1	49.90
30	2	54.10
40	2	54.10

E. ALL CABLE AND BREAKER RATINGS ARE SUPPLIED AS GUIDELINES ONLY. THESE GUIDELINES ARE MINIMUM RECOMMENDATIONS ONLY NOT SUBSTITUTES FOR REVIEW AND COMPLIANCE WITH NEC AND LOCAL CODES. CONSULT WITH YOUR LICENSED ENGINEER FOR SITE SPECIFIC APPLICATIONS.



* Supplied by others
** Internal Batteries available for 40kW units and smaller

SECTION IV

Literature

- Includes applicable brochures for reference only.

10-500kVA
208/480V

APC
Legendary Reliability™

Enterprise and Industrial Power Solutions

Silcon® Series

Delta Conversion On-line™ power protection for datacenter, facilities, and other mission-critical applications

HIGH AVAILABILITY

- Parallel for redundancy full kW range
- (kVA=kW) n+1, n+2
- Less stress on components
- Fewer components needed when paralleling four or less units
- Maintenance bypass switch
- Dual inputs*

**On select models*

INCREASED MANAGEABILITY

- SmartSlot - Built-in accessory slot
- Software configurable features
- SNMP Ready for Manageability
- Intelligent Battery Management
- PowerChute Network monitoring

WORLD-CLASS SERVICE

- Turn key solution - APC Service
- Consultants
- 7x24 Service
- 4 Global call centers
- 4 hour response available
- Award-winning customer service

WARRANTY

- 1 year warranty
- Parts and Labor

Table of contents

Features and benefits 4

Customer testimonials 6

Accessories 8

Services 9

Specifications 10

Introduction

25 Years of 3-phase Experience

With the purchase of Silcon Power Electronics in 1998, APC acquired a superior 3-phase technology 25 years in the making. A manufacturer of traditional double-conversion 3-phase UPSs in the early seventies, Silcon evolved to a second generation single conversion architecture and then, in the late nineties, developed an even more efficient third generation Delta Conversion On-line™ technology. Today customers require a solution that combines the best of double conversion without the unpleasant and costly side effects of input harmonics. This makes APC Silcon Series your new choice for a low cost/high efficiency 3-phase solution.

APC delivers the new wave of 3-phase power protection

What makes a hot technology "hot"? In the eyes of an enterprise customer, "hot" means a technology that's convenient and easy to use, and efficient and trouble-free to operate. A "hot" product is manufactured of high quality materials and as a result of its superior design, inherently carries a low cost of ownership.

All of these characteristics define APC's Silcon® Series Delta Conversion On-line™ machines. The unique architecture of the APC Silcon Series introduces a new category of power protection: the highly efficient 3-phase UPS.

Customers who install APC Silcon Series systems immediately begin to realize benefits in the form of dramatic reductions in energy consumption costs, installation and wiring costs, air conditioning costs, harmonic distortion costs and maintenance costs. More importantly, the APC Silcon Series units excel at their primary function: to supply clean 3-phase power to critical applications, datacenters and facilities regardless of power failures, sags, surges, brownouts, line noise, high voltage spikes, frequency variations and switching transients.

A perfect fit for critical high availability applications

High availability of systems is today a responsibility shared by both information systems departments and facilities departments. Industry statistics show unanticipated power events to be one of the main causes of unscheduled downtime. The unique design of the APC Silcon Series machines offer an elegant and inexpensive solution to customers who seek the peace of mind of redundant UPS systems. APC Silcon Series units configured in redundant mode can help eliminate the weak link of a substandard and unpredictable power supply.

Backed by world-class service and support

The APC Silcon Series is designed to proactively identify and correct power problems to prevent downtime. APC's Global Services Organization will supplement your Silcon Series power protection solution with a world-wide network of trained personnel and automated support systems designed to quickly diagnose and resolve problems. A wide variety of installation, implementation and maintenance packages are available to meet any customer requirement.

Features and benefits

Availability

Customers can now enjoy the benefits of redundant UPSs by configuring and installing multiple 20kVA units. For example, if kVA requirements are high, up to 9 500kVA UPSs can be paralleled to supply the load with the energy it needs. Up to four units can be configured in parallel mode without requiring the installation of expensive external static switches.

Advanced power management

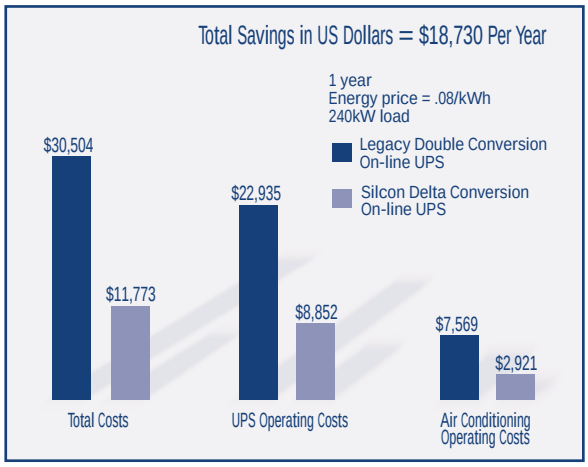
Silcon's intelligent control can be programmed to maximize the overall efficiency of parallel Delta Conversion On-line systems. By designating as "active" only the systems needed to supply the load, the other systems can be held in "stand by" mode, ready to start up without interruption when required. Furthermore, to reduce stress and improve reliability, the load can be switched between the parallel systems in preprogrammed sequences.

Lower cost of ownership

The Silcon Series is higher in efficiency that other online technologies. The Delta Conversion On-line units simply do not consume large quantities of energy and also produce much less heat. Customers need not oversize an air conditioning unit to compensate for the heat loss which traditional UPSs generate.

Lower installation cost

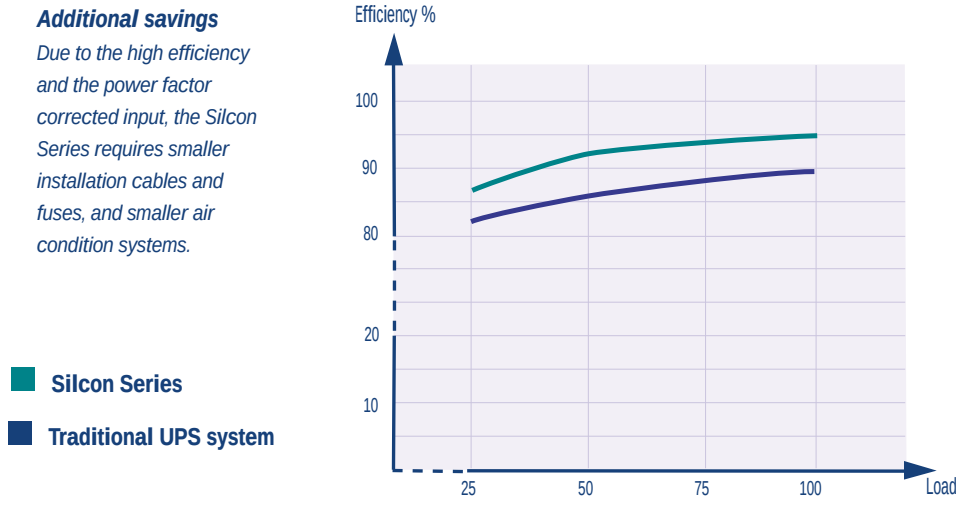
The Silcon Delta Conversion On-line UPS has a power factor corrected input, ensuring that the input power factor is always one, regardless of load and utility voltage. A power factor of one minimizes installation costs by requiring smaller cables and smaller fuses.



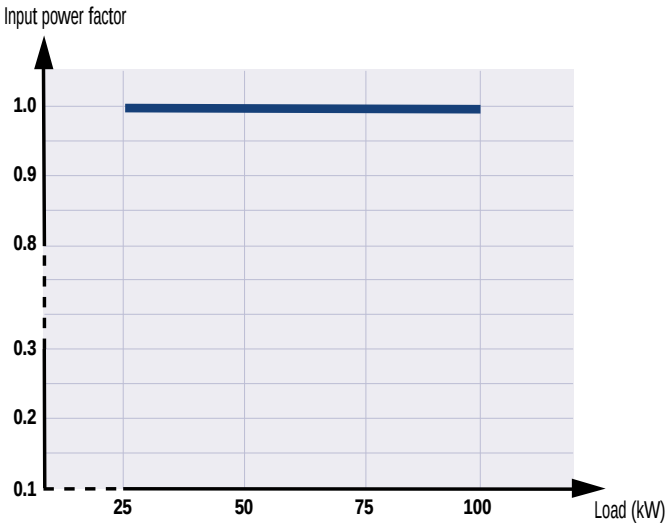
Efficiency, environmental design and industry-leading technology make the Silcon Series the clear choice for enterprise power protection.

Additional savings

Due to the high efficiency and the power factor corrected input, the Silcon Series requires smaller installation cables and fuses, and smaller air condition systems.

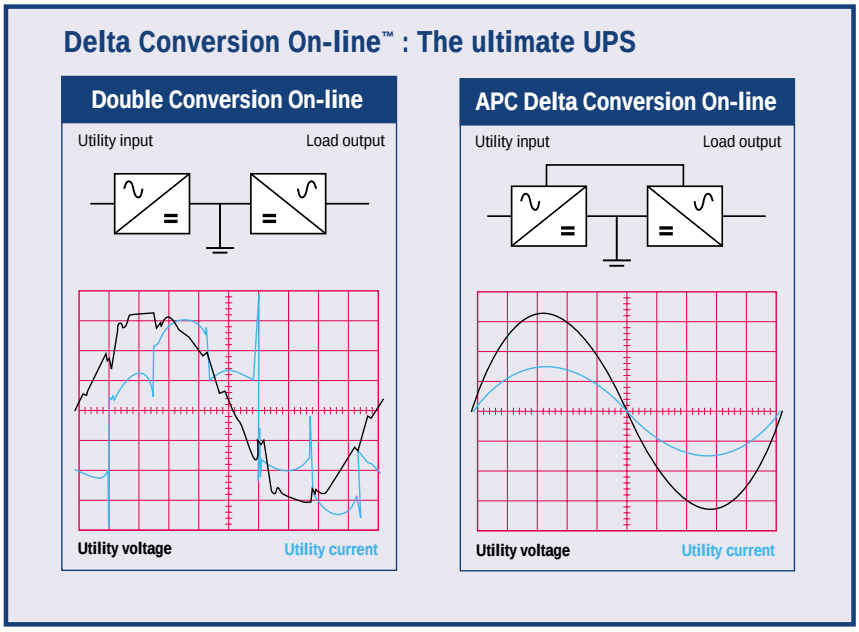


Built-in power factor correction maintains a constant level of one, which minimizes installation costs.



Eliminates wear and tear on electrical infrastructure

Utilities and power distributors are creating standards to limit the harmonic distortion produced by users. Violating these standards can be very costly. Many double conversion 3-phase systems produce a level of harmonic distortion high enough to negatively impact the utility and its customers. To remedy the situation, customer are obliged to install large expensive filters. These filters further diminish the overall efficiency of the double conversion machine. The Silcon Delta Conversion On-line technology, which maintains a sinusoidal utility current, eliminates this 3-phase double conversion topology problem.



Complient with power supplies, for the present and the future (kVA = kW)

Over the past three years, more and more computer manufacturers have built Power Factor Corrected (PFC) power supplies into their servers. In order to avoid unnecessary wear and tear on computer components, the Volt-Amps (VA) requirements of all the computers that make up the load need to equal the Watts (W) capacity of the UPS.

The Silcon Series units are PFC compliant. Without derating the unit, double conversion 3-phase UPS systems are not PFC compliant. Therefore, as more and more PFC computers enter into your datacenter, the probability becomes greater that the legacy double conversion 3-phase UPSs becomes overloaded. With Silcon Series units, this problem is eliminated because the kVA rating of the Silcon Series unit equals the kW rating.

Clear Channel Communications values APC Silcon® reliability, service and support

"The knowledge and support of Sterling Oakes Services, our APC Power Specialist, is a key to our uptime success."

- **Phil Walter**, *Data Center Manager*
Clear Channel Communications

"Our current datacenter supports the corporate financial packages, Web site hosting servers, E-mail servers and ad servers for our radio station Web sites. Our ad servers distribute banner ads to our radio station Web sites and track the revenue from those ads. Downtime is not an option for us.

We contacted our APC Power Specialist, Jeffrey Oakes of Sterling Oakes Services, in Houston, Texas (*www.sterlingoakes.com*). After recommending the APC Silcon Series, Jeff then helped us to acquire and install the unit to support our datacenter. This highly efficient 3-phase solution is just what we needed. It provides us with an extremely clean, cool power source within a very small footprint. We had already installed a 20kW Generator and Automatic Transfer Switch that feeds two 2.5 ton single phase air conditioning units and approximately 11kW worth of critical load. The unique design topology of the APC Silcon unit presented us with a number of advantages. First, the unity power factor of the box eliminated the possibility of harmonic distortion impacting our load or back feeding on the utility line. Second, the high efficiency of the machine could help us to significantly cut operational costs. And third, the APC Silcon Series UPS is the only UPS that could reliably support our load in this type of application.

In the near future, we will be doubling the size of our server room. We are looking forward to purchasing two more APC Silcon Seriess. As we upgrade our radio, TV and outdoor sites, we will be looking for additional power protection solutions. We are confident that this investment will provide us with the clean reliable power we require as we go forward into the 21st Century."

APC 3-phase: Solutions for both IT . . .

IT professional:

Over the years, you have come to recognize APC as a reliability, manageability, and technology leader. As your requirements evolve and your business expands, APC is positioned to grow with you. APC power protection is available today from laptop to datacenter to industrial facility.

. . . and facilities.

Facilities professional:

For over 30 years, your 3-phase power protection choices have been limited. Low efficiency and high heat generated by double conversion have increased your operating costs. Delta Conversion On-line™ technology offers you a reliable, efficient and low cost alternative.

Boston Edison lauds APC Silcon Series service and support

"I now have peace of mind knowing that our facility is protected by the professionals from APC's Global Services Group and their APC Silcon Series."

- Franco Pasquale, *Simulator Team Leader*
Boston Edison, Chiltonville Training Center

"Boston Edison is the leading electric utility company in eastern Massachusetts. We serve a customer base of 650,000 individuals throughout 40 cities and towns including Boston. Boston Edison's annual revenues exceed $1.6 billion. As Simulator Team Leader at Boston Edison's Chiltonville Training Center, one of my responsibilities is to manage the operation of our nuclear power plant control room simulator. We have been an APC customer for a number of years. Our facility has a number of Smart-UPS® as well as Matrix-UPS™ devices.

"Historically, power conditions at our site have been marginal, and, ironically, Boston Edison does not provide power to the site. Power fluctuations have caused a number of equipment failures in the control room simulator, resulting in downtime to effectuate repairs.

"APC sent teams of experts from the APC Global Services Group on two separate occasions in order to take measurements and verify total power used by the system. The professionalism and thoroughness exhibited by the representatives of APC's Global Services Group in explaining all facets of the transition sold me on the APC solution. Power Associates, Inc. determined the extent of the work to be performed and began to estimate the cost in dollars, as well as the time required to perform the 'cut-over' to full UPS power.

"Today, the APC Silcon Series supports the entire simulator complex, including file servers and mini computers that are used to mirror the operation of Boston Edison's Pilgrim Nuclear Power Plant control room. The training facility can simulate any condition, real or imagined, and present it to their students for evaluation and solution. I now have peace of mind knowing that our facility is protected by the professionals from APC's Global Services Group and the APC Silcon Series."

Accessories

Power Accessories

External Battery Solutions

External Battery Solutions are available when runtimes of 15 minutes or greater are required. Part numbers are assigned to the runtime which you need thereby eliminating any lengthy calculations.

External Service By-pass Panel

The External Service By-pass Panel allows for the performance of proactive maintenance on the UPS without dropping the load. This prevents unwanted interruptions and maintenance technicians avoid the risk of electric shock.

External Service By-pass Panel

Management Accessories

PowerChute® Network Shutdown

PowerChute Network Shutdown allows for safe shutdown of servers, notification of end-users, running command files and logging of events. This shutdown software is available for a variety of operating systems including Windows NT, NetWare, HP-UX, Linux, Solaris, and others.

PowerChute Network Shutdown graphical user interface

Web/SNMP Management Card

The Silcon Web/SNMP Card allows monitoring of the Silcon Delta Conversion On-Line UPS from any Web browser. The Silcon Delta Conversion On-Line UPS can also be monitored via Telnet, SNMP (NMS Management Scheme), and the Web.

APC Web SNMP Management Card

MasterSwitch™

The MasterSwitch network power controller can easily reboot remote servers, internetworking equipment, or banks of modems to prevent on-site service calls. MasterSwitch allows remote control of up to eight (8) independent power channels.

APC MasterSwitch

Out-of-band Management Card

The Out-of-band Management Card provides remote access to detailed UPS information, gives you remote paging upon power events, and remote safe reboot of attached equipment via user-supplied modem. Users have the ability to communicate with the UPS even during power outages or when the server is down. The out-of-band management card allows remote power management via serial or modem link.

Out-of-band Management Card

Environmental Monitoring Card

The Environmental Monitoring Card will remotely monitor temperature, humidity, and other environmental conditions via PowerChute *plus* software, Out-of-band management card, Web/SNMP Management Card, or SNMP Agents.

Environmental Monitoring Card

7 x 24 Global Support

Our APC Power Quality Engineers, Power Specialists, High Power Partners, and Professional Services personnel guarantee complete satisfaction with any APC service. When it comes to power management, you deserve the Legendary Reliability™ and peace of mind that only APC Global Services can provide.

Start-UP Service

APC's Start-UP Service provides APC authorized service personnel on site to confirm proper wiring of installation, power-up the APC hardware, and system training. Labor and travel expenses are included in this program. Standard service is offered during normal business hours, excluding holidays.

Essential Power Reliability Package

This offering features a baseline maintenance package for APC's 3-phase UPS systems. The package includes Start-Up Service, one year next business day on-site repair service including parts, batteries (internal only,) labor, and travel expenses. It also provides a preventative maintenance visit and 7x24 telephone technical support, with one hour telephone response time.

Premium Power Reliability Package

This offering provides customers with a turnkey solution for critical computing environments. The package provides all of the benefits of the Essential Reliability Package, plus Site Positioning Services for proper delivery and placement of your UPS into your environment and Installation Consulting Services to provide guidance on the electrical wiring and installation of your system.

The total offering includes Start-UP Service, one year next business day on-site repair service including parts, batteries (internal only), travel expenses, a preventative maintenance visit, Site Positioning Services, Installation Consulting Services, and 7x24 telephone technical support with one hour telephone response time. *For the higher availability systems, a four-hour response option is also available as an upgrade to this service.*

Enterprise Power Reliability Package

This package features the highest level service and support available from APC. The Enterprise Power Reliability Package includes all of the features of the Premium Power Reliability Package, plus an initial PowerAudit®, four hour response on-site repair service and a yearly PowerAudit Review. The Enterprise Reliability Package is tailored for mission critical environments where maximum uptime is required. *This program provides one year four hour response on-site repair service including all parts, batteries (internal only), labor and travel expenses*. Under the Enterprise Power Reliability Package, telephone technical support, Start-Up services and Preventative Maintenance services are provided on a 7x24 basis. *For the higher availability systems, a four-hour response option is also available as an upgrade to this service.*

Annual Maintenance Program

For customers with APC Silcon 3-phase systems installed, it is recommended that an annual maintenance service contract be considered. APC's service policy is to prevent potential problems from occurring. The 3-phase systems contain components and parts which will wear out over time. It is important that only specially trained staff, who are familiar with the inner workings of the APC Silcon 3-phase machines do the maintenance work. These parts must be checked regularly and replaced when appropriate. Regular maintenance helps you to avoid unnecessary downtime.

Under the Annual Maintenance Program APC guarantees next business day on-site repair service and delivery of spare parts for all APC UPS and Power Array™ systems, a thorough annual inspection and test of the system, and 7 x 24 telephone technical support. This service contract assures that your APC hardware solution is always in working condition to protect your critical applications against power failure. Contract is renewed yearly and includes all parts, batteries (internal only), labor and travel expenses.

Remote Monitoring Service

APC's Remote Monitoring Service is an outsourced remote monitoring solution that proactively monitors UPSs and the surrounding environment 7 x 24 to enhance high availability in networking and facilities environments. With the ability to uniquely profile each customer, APC is able to spontaneously react during UPS events in the same manner that your systems personnel would.

Specifications

Please note: General specifications and Input and output specifications are identical for both 208V and 480V Silcon units.

General Specifications	
Static bypass switch	Built-in
Communication Interface	Built-in
Backfeed protection	Built-in
Ambient temperature	32-104˚F (Above 77˚F the battery lifetime is reduced)
Humidity	Max 95%, non-condensing
Protection class	NEMA 1
Safety	UL 1778, EN50091-1
Emission and Immunity	EN50091-2
Advanced Batt. Monitoring	Programmable
Auto restart	Programmable
Options	Parallel operation board, NEMA 12 Enclosure, Terminals for external batteries, Alarm relay board
Power Accessories	Isolation transformer, Service bypass panel (line up and match), Remote display, External battery cubicle (lineup and match) ,Static Switch
Management Accessories	PowerChute Network Shutdown, Web/SNMP Card, MasterSwitch™, Environmental Monitoring Card, Out-of-band Management Card.

Input and Output Specifications							
Input voltage	3 x 208V or 3 x 480V						
Input operation tolerance	±15%						
Input bypass tolerance	±10% (standard), ±4, 6, 8% (programmable)						
Input frequency	60Hz (standard), ±0.5-8% (programmable)						
Input PF	load 25% min. 0.97, load 100% min. 0.99						
Output voltage	3x208V, 3 x 480V						
Voltage tolerance	±1% static, sym. load, ±3% static, asym. load, ±5% 1-100% load step						
Voltage distortion	max 3%, linear load, max 5%, non-linear load						
Load power factor	0.9 lead to 0.8 lag						
Output frequency	60Hz (mains synchronized), ±0.1% free running						
Overload capacity	Mains operation 200% - 60 secs; Mains operation 125% - 10 mins.; Battery operation 150% - 30 secs.; Bypass operation125% - cont., 1000% - 500ms						
Type	SL10KF SL10KFB1[1]	SL15KF SL15KFB1[1] SL15KFB2[2]	SL20KF SL20KFB1[1] SL20KFB2[2]	SL30KF SL30KFB2[2]	SL40KF SL40KFB2[2]	SL60KF	SL80KF
Output power	10kW/10kVA	15kW/15kVA	20kW/20kVA	30kW/30kVA	40kW/40kVA	60kW/60kVA	80kW/80kVA
Full load output current	27.8A	41.6A	55.5A	83.3A	110.0A	166.5A	222.1A
Max input current	37.5A	56.3A	75.0A	113.0A	150.0A	225.0A	300.0A
Efficiency AC to AC: 100% load 50% load	93.6% 91.9%	93.6% 90.5%	94.5% 92.0%	94.7% 92.6%	95.0% 93.8%	95.0% 94.0%	95.1% 94.8%
Heat dissipation, nominal load	2388 BTU	3412 BTU	4094 BTU	5800 BTU	7165 BTU	10918 BTU	13989 BTU
Audible noise 70-100% load	55/55dB(A)	55/65dB(A)	55/65dB(A)	55/65dB(A)	55/65dB(A)	65/75dB(A)	65/75dB(A)
Height	55.12 in.	55.12 in.	55.12 in.	55.12 in.	55.12 in.	59.06 in.	59.06 in.
Width	23.62 in.	39.37 in.	39.37 in.	39.37 in.	39.37 in.	39.37 in.	39.37 in.
Depth	31.50 in.	31.50 in.	31.50 in.	31.50 in.	31.50 in.	31.50 in.	31.50 in.
Weight[3]	803 lbs	902 lbs.	902 lbs.	1430 lbs.	1430 lbs.	1165 lbs.	1165 lbs.
Type	SL10KG SL10KGB1[1]	SL15KG SL15KGB1[1] SL15KGB2[2]	SL20KG SL20KGB1[1]	SL30KG SL30KGB2[2]	SL40KG SL40KGB2[2]	SL60KG	SL80KG
Output power	10kW/10kVA	15kW/15kVA	20kW/20kVA	30kW/30kVA	40kW/40kVA	60kW/60kVA	80kW/80kVA
Full load output current	12.0A	18.0A	24.1A	36.1A	48.1A	72.2A	96.2A
Max input current	15.6A	23.5A	31.3A	47.0A	62,5A	94.0A	125.0A
Efficiency AC to AC 100% load	94.3%	94.3%	94.9%	94.3%	95.0%	94.0%	95.0%
50% load	91.3%	92.0%	93.3%	91.5%	92.9%	90.3%	92.3%
Heat dissipation, nominal load	2047 BTU	3071 BTU	3753 BTU	6142 BTU	7165 BTU	12966 BTU	14330 BTU
Audible noise 70-100% load	55/55dB(A)	55/65dB(A)	55/65dB(A)	55/65dB(A)	55/65dB(A)	65/75dB(A)	65/75dB(A)
Height	55.12 in.	55.12 in.	55.12 in.	55.12 in.	55.12 in.	55.12 in.	55.12 in.
Width	23.62 in.	23.62 in.	23.62 in.	39.37 in.	39.37 in.	39.37 in.	39.37 in.
Depth	31.50 in.	31.50 in.	31.50 in.	31.50 in.	31.50 in.	31.50 in.	31.50 in.
Weight[3]	869 lbs.	990 lbs.	990 lbs.	1606 lbs.	1606 lbs.	1122 lbs.	1166 lbs.

[1] Unit with one internal battery (add 385 lbs. to total weight)
[2] Unit with two internal batteries (add 770 lbs. to total weight).
[3] Weights given for units without internal batteries.

480V Solutions—120kW/120kVA - 500kW/500kVA						
Type	SL120KG	SL160KG	SL240KG	SL320KG	SL400KG	SL500KG
Output power	120kW/120kVA	160kW/160kVA	240kW/240kVA	320kW/320kVA	400kW/400kVA	500kW/500kVA
Full load output current	144A	192A	289A	385A	481A	601A
Max input current	188A	250A	375A	500A	625A	782A
Audible Noise (nominal max.)	72dB(A)	72dB(A)	73dB(A)	73dB(A)	78dB(A)	78dB(A)
Efficiency AC to AC typically at nominal load	94.6%	95.5%	94.9%	95.7%	96.2%	96.3%
Heat dissipation, nominal load	23202 BTU	25590 BTU	44015 BTU	49133 BTU	53910 BTU	65510 BTU
Height	70.9 in.	70.9 in.	70.9 in.	70.9 in.	70.9 in.	70.9 in.
Width	63 in.	63 in.	74.8 in.	74.8 in.	94.5 in.	94.5 in.
Depth	31.5 in.	31.5 in.	31.5 in.	31.5 in.	31.5 in.	31.5 in.
Weight	3080 lbs.	3080 lbs.	4432 lbs.	4432 lbs.	5512 lbs.	5512 lbs.

APC Service Bypass Panel Quick Reference Guide - Single Mains Input							
UPS Configs.	Cap. x1	Cap. x2	Cap. x3	Cap. x4	Red. x2	Red. x3	Red. x4
SL10KF	SL0901482	-	-	-	SL091485	-	-
SL10KG	SL0901482	-	-	-	SL091485	-	-
SL15KF	SL0901483	-	-	-	SL091486	-	-
SL15KG	SL0901482	-	-	-	SL091485	-	-
SL20KF	SL0901483	-	-	-	SL091486	-	-
SL20KG	SL0901482	-	-	-	SL091485	-	-
SL30KF	SL0901484	-	-	-	SL091487	-	-
SL30KG	SL0901483	-	-	-	SL091486	-	-
SL40KF	SL0901484	-	-	-	SL091487	-	-
SL40KG	SL0901483	-	-	-	SL091486	-	-
SL60KF	SL0901625	-	-	-	-	-	-
SL60KG	SL0901484	-	-	-	SL091487	-	-
SL80KF	SL0901625	-	-	-	-	-	-
SL80KG	SL0901484	-	-	-	SL091487	-	-
SL120KG	SBP-0120C1G10	SBP-0120C2G10	SBP-0120C3G10	SBP-0120C4G10	SBP-0120R2G10	SBP-0120R3G10	SBP-0120R4G10
SL160KG	SBP-0160C1G10	SBP-0160C2G10	SBP-0160C3G10	SBP-0160C4G10	SBP-0160R2G10	SBP-0160R3G10	SBP-0160R4G10
SL240KG	SBP-0240C1G10	SBP-0240C2G10	SBP-0240C3G10	SBP-0240C4G10	SBP-0240R2G10	SBP-0240R3G10	SBP-0240R4G10
SL320KG	SBP-0320C1G10	SBP-0320C2G10	SBP-0320C3G10	SBP-0320C4G10	SBP-0320R2G10	SBP-0320R3G10	SBP-0320R4G10
SL400KG	SBP-0400C1G10	SBP-0400C2G10	SBP-0400C3G10	SBP-0400C4G10	SBP-0420R2G10	SBP-0420R3G10	SBP-0420R4G10
SL500KG	SBP-0500C1G10	SBP-0500C2G10	SBP-0500C3G10	SBP-0500C4G10	SBP-0500R2G10	SBP-0500R3G10	SBP-0500R4G10
UPS Configs.	Cap. x1	Cap. x2	Cap. x3	Cap. x4	Red. x2	Red. x3	Red. x4
SL120KG	SBP-0120C1G20	SBP-0120C2G20	SBP-0120C3G20	SBP-0120C4G20	SBP-0120R2G20	SBP-0120R3G20	SBP-0120R4G20
SL160KG	SBP-0160C1G120	SBP-0160C2G20	SBP-0160C3G20	SBP-0160C4G20	SBP-0160R2G20	SBP-0160R3G20	SBP-0160R4G20
SL240KG	SBP-0240C1G20	SBP-0240C2G20	SBP-0240C3G20	SBP-0240C4G20	SBP-0240R2G20	SBP-0240R3G20	SBP-0240R4G20
SL320KG	SBP-0320C1G20	SBP-0320C2G20	SBP-0320C3G20	SBP-0320C4G20	SBP-0320R2G20	SBP-0320R3G20	SBP-0320R4G20
SL400KG	SBP-0400C1G20	SBP-0400C2G20	SBP-0400C3G20	SBP-0400C4G20	SBP-0420R2G20	SBP-0420R3G20	SBP-0420R4G20
SL500KG	SBP-0500C1G20	SBP-0500C2G20	SBP-0500C3G20	SBP-0500C4G20	SBP-0500R2G20	SBP-0500R3G20	SBP-0500R4G20

Please note: 10-80kW systems include parallel board; 120-500kW systems include parallel board and relay board.

APC Battery Cabinet Quick Reference Guide								
Runtime Options	5-7 min.	8-14 min.	15-19 min.	20-29 min.	30-39 min.	40-49 min.	50-75 min.	>75 min.
SL10KF	-	-	-	-	-	BDP2010J41-1CO	BDP2010J70-1CO	BDP20102H-1CO
SL10KG	-	-	-	-	-	-	-	BDP2010J2H-1CO
SL15KF		-	-	BDP2015J24-1CO	-	BDP2015J41-1CO	BDP2015J63-1CO	-
SL15KG	-	-	-	-	-	-	BDP4015J62-1CO	-
SL20KF	-	-	BDP2020J15-1CO	-	BDP2020J28-1CO	BDP2020J47-1CO	BDP2020J72-1CO	-
SL20KG	-	-	-	-	-	BDP4020J42-1CO	BDP4020J72-1CO	-
SL30KF	BDP2030J8-1CO	-	BDP2030J16-1CO	BDP2030J27-1CO	-	BDP2030J44-1CO	BDP2030J61-1CO	-
SL30KG	-	-	-	BDP4030J24-1CO	-	BDP4030J40-1CO	BDP4030J68-1CO	-
SL40KF	-	BDP2040J10-1CO	BDP2040J18-1CO	-	BDP2040J30-1CO	BDP2040J44-1CO	BDP2040J59-1CO	-
SL40KG	-	-	BDP4040J15-1CO	BDP4040J28-1CO	-	BDP4040J46-1CO	BDP4040J73-2CO	-
SL60KF	-	BDP2060J8-1CO	BDP2060J16-1CO	BDP2060J25-1CO	BDP2060J36-1CO	-	BDP2060J59-2CO	-
SL60KG	-	BDP4060J8-1CO	BDP4060J15-1CO	BDP4060J26-1CO	-	BDP4060J42-2CO	BDP4060J60-2CO	-
SL80KF	-	BDP2080J9-1CO	BDP2080J17-1CO	BDP2080J22-1CO	BDP2080J36-2CO	BDP2080J43-2CO	BDP2080J59-2CO	-
SL80KG	-	BDP4080J10-1CO	BDP4080J17-1CO	BDP4080J29-2CO	BDP4080J35-2CO	BDP4080J42-2CO	BDP4080J59-2CO	-
SL120KG	BDP4120J5-1CO	BDP4120J8-1CO	BDP4120J15-2CO	BDP4120J25-2CO	BDP4120J35-2CO	BDP4120J44-4CO	-	-
SL160KG	BDP4160J5-1CO	BDP4160J9-2CO	BDP4160J16-2CO	BDP4160J22-2CO	BDP4160J42-4CO	-	-	-
SL240KG	BDP4240J6-2CO	BDP4240J9-2CO	BDP4240J16-4CO	BDP4240J25-4CO	BDP4240J35-4CO	-	-	-
SL320KG	BDP4320J5-2CO	BDP4320J13-4CO	BDP4320J22-4CO	BDP4320J29-6CO	-	-	-	-
SL400KG	BDP4400J7-4CO	BDP4400J12-4CO	BDP4400J15-4CO	BDP4400J22-6CO	BDP4400J30-6CO	-	-	-
SL500KG	BDP4500J5-4CO	BDP4500J8-4CO	BDP4500J15-6CO	BDP4500J20-6CO	BDP4500J33-8CO	-	-	-

High Availability on Wheels

Facilities and consulting electrical engineers can now view the latest in UPS technology without leaving their offices.

The APC Mobile Availability Center (MAC) is a traveling training and demonstration laboratory designed to assist IT and facilities professionals in identifying appropriate solutions to increase power availability. The APC MAC houses a broad selection of APC power protection and management solutions including APC's Silcon™ DP300E series, Symmetra® Power Array™, the newest Smart-UPS® solutions, as well as a variety of accessories and UPS management software, all which help increase the availability of essential business processes.

The APC MAC is equipped to seat visitors in a classroom style setting.An APC application engineer will conduct presentations and lead attendees in question and answer sessions. The APC MAC presentation includes a number of product demonstrations focused on promoting power and system availability of datacenters and facilities. This traveling road show reinforces APC's commitment to partner with its customers to help ensure that the total solution effectively addresses the customer's availability needs.

Go the Web now for more information about the Silcon Series at www.apcc.com/products/silcon_dp300e *for in-depth information, Silcon video, and Installation and User guides (available for download in pdf format.)*

APC's quality system is certified by ISO 9002 standards

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APC® Legendary Reliability™

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BSI Certification 7OD0005US rev.03

LC-R127R2P

For main and standby power supplies.
Expected trickle life: 3-5 years at 25°C, Approx. 5 years at 20°C.

Photo/Label for reference only.

Specifications

Nominal voltage		12V
Rated capacity (20 hour rate)		7.2Ah
Dimensions	Length	5.945 inches (151.0 mm)
	Width	2.539 inches (64.5 mm)
	Height	3.702 inches (94.0 mm)
	Total Height*	3.937 inches (100.0 mm)
Approx. mass		5.45 lbs (2.47 kg)
Standard Terminals and Resin	UL94HB Faston 187	LC-R127R2P
	UL94HB Faston 250	LC-R127R2P1
Optional Terminals and Resin	UL94V-0 Faston 187	♦ LC-V127R2P
	UL94V-0 Faston 250	♦ LC-V127R2P1

* The total height with #250 terminal is 101.5mm.

♦ Please contact Panasonic for availability on optional items. Optional items may be subject to minimum order quantities.

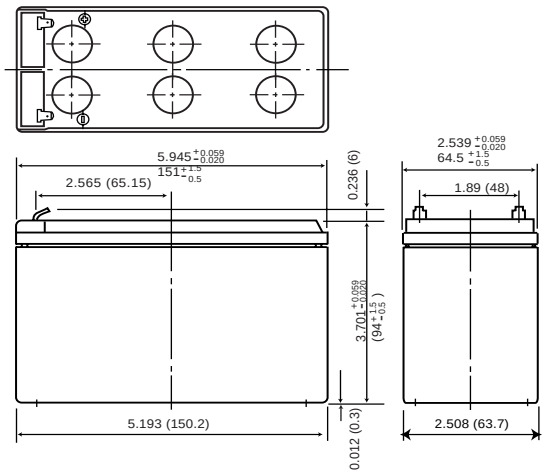
Characteristics

Capacity (note) 77°F (25°C)	20 hour rate (360mA) 10 hour rate (680mA) 5 hour rate (1260mA) 1 hour rate (4900mA)	7.2Ah 6.8Ah 6.3Ah 4.9Ah
	1.5 hour rate discharge Cut-off voltage 10.5 V	3.5A
Internal resistance	Fully charged battery 77°F (25°C)	Approx. 40mΩ
Temperature dependency of capacity (20 hour rate)	104°F (40°C) 77°F (25°C) 32°F (0°C) 5°F (-15°C)	102% 100% 85% 65%
Self discharge 77°F (25°C)	Residual capacity after standing 3 months Residual capacity after standing 6 months Residual capacity after standing 12 months	91% 82% 64%
Charge Method (Constant Voltage) — Cycle use (Repeating use)	Initial current	2.88 A or smaller
	Control voltage	14.5V to 14.9 V (per 12V cell 25°C)
Charge Method (Constant Voltage) — Trickle use	Initial current	1.08 A or smaller
	Control voltage	13.6V to13.8V (per 12V cell 25°C)

(Note) The above characteristics data are average values obtained within three charge/discharge. Cycles not the minimum values.

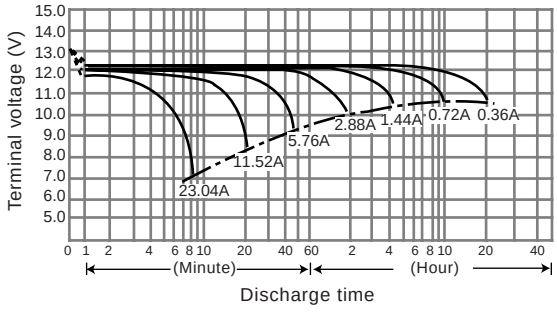
Dimensions (mm)

Terminal type: Faston 187 or Faston 250

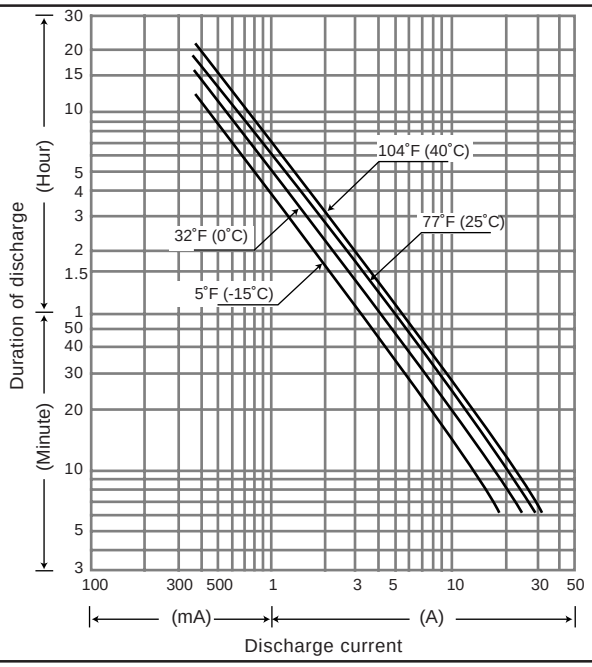


Battery case resin: Standard (UL94HB) Color is black.
Optional (UL94V-0) Color is grey.

Discharge characteristics 77°F (25°C) (Note)



Duration of discharge vs. Discharge current (Note)



This information is generally descriptive only and is not intended to make or imply any representation, guarantee or warranty with respect to any cells and batteries. Cell and battery designs/specifications are subject to modification without notice. Contact Panasonic for the latest information.

Panasonic®

BATTERY SALES GROUP

MATERIAL SAFETY DATA SHEET

LC SEALED LEAD ACID BATTERY SERIES

Section I: Chemical Product and Company Identification

Product Identity: Sealed Lead Acid Battery

Trade Name: Panasonic LC Valve Regulated Lead Acid Battery Series

Distributor:
Panasonic Industrial Company - Battery Sales Group
Two Panasonic Way/7A-1, Secaucus, New Jersey 07094

Manufacturer:
Matsushita Battery Industrial
Osaka, 570, Japan

For Chemical Emergency
Spill, Leak, Fire, Exposure or Accident
Call CHEMTREC – Day or Night
1-800-424-9300

Telephone Number for General Information
Toll Free 1-877-726-2228
Internet: www.panasonic.com/batteries

Section II: Hazardous Ingredients / Identity Information

Component	Common Name	Chemical Name	OSHA PEL	ACGIH TLV	CAS#
Lead	(Negative Electrode and Grid)	Pb	0.05 mg/m^3	0.15 mg/m^3	7439-92-1
Lead Oxide	(Positive Electrode)	PbO_2	0.05 mg/m^3	0.15 mg/m^3	1309-60-0
Lead Sulfate	(Positive and Negative Electrode)	$PbSO_4$	0.05 mg/m^3	0.15 mg/m^3	7446-14-2
Sulfuric Acid	(Electrolyte)	H_2SO_4	1.0 mg/m^3	1.0 mg/m^3	7664-93-9

Percentages of components are dependant both on the model of the battery and state of charge/discharge of the battery. Sulfuric Acid is reportable under Sections 311, 312 and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA). Reportable Quantity: 500 Pounds.

Overall Chemical Reaction: $PbO2 + Pb + 2H_2SO_4 \diamond 2PbSO_4 + 2H_2O$

Note: Panasonic Sealed Lead Acid batteries are a sealed, non-spillable design. Under normal use and handling the customer has no contact with the internal components of the battery or the chemical hazards. Under normal use and handling these batteries do not emit regulated or hazardous substances. Warning: Battery terminals/posts and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands thoroughly after working with batteries and before eating, drinking or smoking.

Section III: Physical / Chemical Characteristics

Boiling Point: Electrolyte 110°C - 112°C

Vapor Pressure: Electrolyte 11.7 mm Hg. at 20°C

Vapor Density (AIR = 1): Electrolyte 3.4

Solubility in Water: Lead, Lead Oxide and Lead Sulfate are insoluble in water. Sulfuric Acid is 100% soluble in water.

Appearance and Odor: The entire battery is a solid article consisting of an opaque plastic case with two protruding lead terminals. The battery is odorless. Sulfuric Acid is a liquid.

Specific Gravity (H2O = 1) Electrolyte 1.300

Health Hazard Information (Acute and Chronic) - Sulfuric Acid only.

The International Agency for Research on Cancer (IARC) has classified “strong inorganic acid mist containing sulfuric acid” as a Category I carcinogen, a substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within the battery. Inorganic acid mist (sulfuric acid mist) is not generated under normal use of this product. Misuse of the product, such as overcharging, may however result in the generation of sulfuric acid mist.

Routes of Entry: By inhalation (mist), skin and eyes, ingestion.

Acute: Tissue destruction on contact. May cause 2nd and 3rd degree burns or blindness. Ingestion will cause corrosive burns on contact. May be fatal if swallowed.

Chronic: Inhalation of mists may cause upper respiratory irritation.

Signs and Symptoms: Irritation and burning of exposed tissues.

Medical Conditions: Respiratory disorders may be aggravated by prolonged inhalation of mists.

Section IV: Emergency and First Aid Procedures

Battery Electrolyte

Inhalation:	Remove to fresh air. Give oxygen or artificial respiration if needed. **Get immediate medical attention.**
Eye Contact:	Flush with plenty of water for at least 15 minutes. **Get immediate medical attention.**
Skin Contact:	Remove contaminated clothing and flush affected areas with plenty of water for at least 15 minutes.
Ingestion:	Do not induce vomiting. Dilute by giving large quantities of water. If available give several glasses of milk. Do not give anything by mouth to an unconscious person. **Give CPR if breathing has stopped. Get immediate medical attention.**

Section V: Fire and Explosion Hazard Data

Flash Point:	Not Applicable
Flammable Limits:	Lower 4.10% (Hydrogen gas) Upper 74.20%
Extinguishing Media:	Dry chemical, foam, halon or CO_2.

Special Fire Fighting Procedures:
If batteries are on charge, turn off power. Use positive pressure, self-contained breathing apparatus in fighting fire. Water applied to electrolyte generates heat and causes it to splatter. Wear acid resistant clothing. Ventilate area well.
Unusual Fire and Explosion Hazards:
Hydrogen and oxygen gases are generated in cells during normal battery operation or when on charge. (Hydrogen is flammable and oxygen supports combustion). These gases enter the air through the vent caps. To avoid risk of fire or explosion, keep sparks and other sources of ignition away from the battery. Do not allow metal objects to simultaneously contact both positive and negative terminal of batteries. Ventilate area well.

Section VI: Reactivity Data

Stability:	Stable under normal conditions.
Conditions to Avoid:	Sparks and other sources of ignition. Prolonged overcharge. Fire or explosion hazard due to possible hydrogen gas generation.

Incompatibility:
Combination of sulfuric acid with combustibles and organic materials may cause fire and explosion. Avoid strong reducing agents, most metals, carbides, chlorates, nitrates, picrate.
Hazardous Decomposition Products: Hydrogen gas may be generated in an overcharged condition, in fire or at very high temperatures. CO, CO_2 and sulfur oxides may emit in fire.
Hazardous polymerization will not occur.

Section VII: Precautions for Safe Handling and Use

Steps to be Taken in Case of Broken Battery Case or Electrolyte Leakage:
Neutralize any electrolyte or exposed internal battery parts with soda ash (sodium bicarbonate) until fizzing stops. Keep untrained personnel away from electrolyte and broken battery. Place broken battery and clean-up materials in a plastic bag or non-metallic container. Dispose of clean-up materials as a hazardous waste. Ventilate area as hydrogen gas may be given off during neutralization.
Waste Disposal Method:
This battery is recyclable. It is illegal to dispose of this battery by another means than ultimately returning to a secondary lead smelter for recycling. For more information on recycling these batteries call toll-free, 1-800-SAV-LEAD (1-800-728-5323).
Hazardous Waste Codes: D002, D008.
Precautions to be Taken in Handling, Storing and Transportation:
Store in cool, dry area away from combustible materials. Do not store in sealed, unventilated areas. Avoid overheating and overcharging.
Other Precautions:
Do not charge in unventilated areas. Do not use organic solvents or other than recommended chemical cleaners on battery.

Section VIII: Control Measures / Personal Protection

General:

Normal room ventilation is sufficient during normal use and handling. Recommend 2 to 3 room air changes per hour to prevent buildup of hydrogen gas.

Personal Protective Equipment (In the Event of Battery Case Breakage):

Always wear safety glasses with side shields or full face shield.

Use rubber or neoprene gloves.

Wear acid resistant boots, apron or clothing.

Work/Hygienic Practices:

Remove jewelry, rings, watches and any other metallic objects while working on batteries. All tools should be adequately insulated to avoid the possibility of shorting connections. DO NOT lay tools on top of battery. Be sure to discharge static electricity from tools and individual person by touching a grounded surface in the vicinity of the batteries, but away from cells. Batteries are heavy. Serious injury can result from improper lifting or installation. DO NOT lift, carry, install or remove cells by lifting or pulling the terminal posts for safety reasons and because terminal posts and post seals may be damaged. DO NOT wear nylon clothes or overalls as they can create static electricity. DO KEEP a fire extinguisher and emergency communications device in the work area.

IMPORTANT:

Wash hands thoroughly after working with batteries and before eating, drinking or smoking.

Section IX: Regulatory Information

NFPA Hazard Rating for Sulfuric Acid:

Flammability (Red) = 0 Health (Blue) = 3 Reactivity (Yellow) = 2

Section X: Transportation Information

Identification and Proper Shipping Name:

Batteries – Wet, Non-Spillable, Electric Storage, UN 2800.

DOT - Unregulated, meets the requirements of 49 CFR 173, 159 (d).

IATA/ICAO - Unregulated, meets the requirements of Special Provision A67.

IMO - Unregulated.

***For all modes of transportation, each battery and outer package must be labeled: "Non-Spillable" or "Non-Spillable Battery." This label must be visible during transportation.**

Section XI: California Proposition 65 Information

The State of California has determined that certain battery terminals contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. IMPORTANT: WASH HANDS THOROUGHLY AFTER WORKING WITH BATTERIES AND BEFORE EATING, DRINKING OR SMOKING.

Section XII: Other Information - Notice to Readers

NOTICE TO READERS:

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty (either expressed or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein. This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his own particular use. Panasonic Industrial Company does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this information nor de we offer warranty against patent infringement. Additional information is available by calling the telephone number on page one (1) designated for this purpose.

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Supplemental Information on Panasonic Sealed Lead Acid Batteries

Transportation

All Panasonic sealed lead acid batteries are considered "non-spillable" for purposes of transportation by the U.S. Department of Transportation (DOT), International Civil Aviation Administration (ICAO), the International Air Transport Association (IATA) and the International Maritime Dangerous Goods regulations (IMDG). They are considered "non-spillable" by DOT by passing the Vibration Test and Pressure Differential Test as required in 49 CFR 173.159(d). They are also considered to be "non-spillable" by both ICAO and IATA by exceeding the requirements of Special Provisions "A67" as defined in their 1998 Handbooks.

Our batteries are authorized for transportation on deck or under deck storage on either a passenger or cargo vessel by passing the Vibration and Pressure Differential Tests as described in the International Maritime Dangerous Goods Regulations (IMDG).

To transport these batteries as "non-spillable" they must be shipped in a condition that would protect them from short-circuits and be securely packaged so as to withstand conditions normal to transportation. For transportation by a consumer, in or out of a device, they are unregulated thus requiring no additional special handling or packaging.

All of our lead acid batteries and their outside packaging, manufactured after September 30, 1995 are labeled "NON-SPILLABLE" per 49 CFR 173.159(d). If you repackage our batteries either as batteries or as a component of another product you must label the outer package "NON-SPILLABLE" per 49 CFR 173.159(d).

Assure Proper Recycling!

Sealed Lead Acid batteries destined for recycling can be managed under the federal *Universal Waste Rule* codified at 40 CFR Part 273.

In the event of disposal, dispose only in accordance with federal, state and local regulation. Batteries generated as a waste are subject to the Resource Conservation and Recovery Act (RCRA) as a D008 (lead) hazardous waste.

Panasonic SLA Recycling Program

The Panasonic SAV-LEAD Recycling Program for the collection and recycling of sealed lead acid batteries (SLA) covers all Panasonic Sealed Lead Acid Batteries. The proper disposal of spent SLA batteries is becoming more of a critical issue, both from the viewpoint of environmental stewardship and from compliance with federal and state environmental regulations. Panasonic recognizes the burdens and responsibilities that have been placed on our customers to properly dispose of spent SLA batteries and is proud to offer this voluntary nationwide battery recycling program.

Federal and State Requirements for Proper Disposal

Federal and State laws prohibit the improper disposal of all lead acid batteries. The battery end users (owners) are responsible for their batteries from the date of purchase through their ultimate disposal. The only legally acceptable method of disposal of lead acid batteries is to recycle them at Resource Conservation and Recovery Act (RCRA) approved secondary lead smelter. This Panasonic SAV-LEAD Recycling Program will allow for you to arrange for the recycling of your SLA batteries from anywhere in the United States. The Program will accept Panasonic and other SLA batteries regardless of manufacturer. Panasonic will handle all SLA batteries returned in an environmentally sound manner designed to comply with all applicable Federal and State laws and regulations. Panasonic will send batteries only to fully-permitted secondary lead smelters that we believe meet the highest environmental standards. Once the SLA batteries are received by Panasonic, the cost to transport the batteries to the secondary lead smelter and the actual recycling costs will be borne by Panasonic.

See the next page for How the SAV-LEAD Recycling Program Works

Supplemental Information on Panasonic Sealed Lead Acid Batteries (Cont.)

How the SAV-LEAD Recycling Program Works

1) We encourage all of our customers to serve as SLA collection centers for your customers, thereby establishing a reverse distribution network between the end user and the secondary lead recycling facility.
2) All shipments to our national consolidation facility must be prepaid. No freight collect shipments will be accepted. All freight collect and non-SLA batteries will be returned to the shipper.
3) Panasonic will maintain on file all necessary documentation for EPA reference. A copy will be provided upon request.
4) All batteries must be shipped, prepaid to our MBIA-SBD manufacturing facility that serves as our national consolidation facility. (See *exception* below).

SHIPPING ADDRESS:
MBIA-SBD
1 Battery Boulevard
Columbus, Georgia 31907
Attn: SLA Recycling Program

5) Only SLA batteries that meet the U.S. Department of Transportation (DOT) "NON-SPILLABLE" (49 CFR 17.159d) requirements will be accepted by this program.
6) Panasonic reserves the right to alter or discontinue this program at any time.

Packaging Requirements

1) All SLA batteries must be fully discharged and packaged in a manner as to insure safe handling and conform to all applicable DOT regulations. (49 CFR 173.159). A dab of silicon caulking or non-conductive tape on each terminal will ensure that no direct shorts occur during shipment.
2) SLA battery shipments should be made in pallet quantities whenever possible.
3) Palletized shipments should be secured with metal bands or poly-wrapped with stack height limited to four (4) feet.
4) SLA batteries shipped on pallets should be of uniform size or be stacked with the larger batteries on the bottom.
5) SLA batteries should be stacked upright in a head-to-base arrangement. Each layer should be separated by cardboard to prevent accidental shorting.
6) Smaller quantities of SLA batteries may be shipped via standard UPS. Be sure that each box does not exceed the UPS weight limit of 70 lbs. A dab of silicon caulking or non-conductive tape on each terminal will ensure that no shorts occur during shipment.
7) The outside of every pallet and individual box must be labeled "NON-SPILLABLE" as required by DOT regulations. This label must be visible during transportation.

Exception:

Full Truck Loads - All full-truck-load shipments of SLA batteries from anywhere in North America must be scheduled with our MBIA-SBD facility prior to shipment. To schedule shipments to our MBIA-SBD facility, please call (706) 569-9979.

Consumer Users of Panasonic SLA Batteries

All Panasonic SLA batteries are chemically identical to common automotive starter batteries and can be returned to any site that accepts automotive lead acid batteries for recycling. Examples include retailers of automotive batteries, automotive service centers, scrap metal dealers, etc…

For additional information on this program or information on how to recycle other Panasonic batteries please call your local Panasonic Battery Sales Group sales office.

Panasonic Batteries
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A Division of Matsushita Electric Corporation of America
Two Panasonic Way
Secaucus, NJ 07094
Toll Free: 877-726-2228
Fax: 847-468-5750
e-mail: oembatteries@panasonic.com
Internet: www.panasonic.com/batteries